THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

VOL. 23 NEW YORK, MARCH, 1925 No. 3

Annual Meeting of the Institute of Metals Division

A Report of the Sessions Held in New York, February 16-17, 1925

The 1925 meeting of the Institute of Metals Division was held in the Engineering Building, New York, three sessions being held in all. In addition there was the semi-annual dinner, held on Monday, February 16, at 6 P. M., at the Engineers' Club. The annual lecture was delivered by **Dr. Carl Benedicks,** Director of the Metallographic Institute, Stockholm, Sweden, on the subject of Corrosion Studies with Special Reference to Hot Wall Action and Segregation. The meetings were attended by an unusually large number of members and visitors, gathering over 200 at each of the sessions.

Three new members were elected to the Executive Committee to replace those whose terms had expired. The new members were: **R. F. Wood,** Irvington Smelting & Refining Company, Irvington, N. J.; **W. K. Frank,** Damascus Bronze Company, Pittsburgh, Pa.; **R. L. Suhl,** International Nickel Company, of New York.

At the dinner, **Professor White** made a strong plea for the technical societies to urge state legislatures to stronger support of industrial and technical research. He showed that in Michigan for example, agriculture had been granted $250,000 for research in an industry which produced $400,000,000 worth of products, while industry which produced $3,000,000,000 worth of products had been allowed only $10,000 for research purposes.

The lecture by **Dr. Benedicks** explained his theory of "Hot Wall Action" as a cause of pitting and corrosion of condenser tubing. According to this theory, local superheating, due to the precipitation of air from the water in the tubes cause an increase of chemical attack at various superheated spots. These spots become pitted and at the same time subject to extremely rapid corrosion.

To overcome this difficulty he suggested the removal of the air from the water before use. He showed how the air could be removed by successive heatings, applying the same hot wall principle which caused the local superheating in the condenser tubes. The lecture was illustrated with numerous slides, one of which showed, in actual motion, an experiment being performed on the de-aeration of water.

Abstracts of papers read at the sessions are as follows:

DEVELOPMENTS IN HIGH-STRENGTH ALUMINUM ALLOY

By Robert S. Archer and Zay Jeffries, Cleveland, Ohio

Two new alloys of the "strong alloy" class having improved fabricating qualities are described; also methods of producing alloys of the duralumin type with greater strength and hardness than previously obtained.

TWO NEW TYPES OF ALLOY

1. The aluminum-copper type: shows substantially no hardness increase on aging at ordinary temperatures after quenching from around 500° C., but is susceptible to marked hardening by reheating at 100° to 175° C. (artificial aging). Some of the results were obtained on an alloy containing 3.95 per cent copper, 0.35 per cent iron and 0.21 per cent silicon.

2. The aluminum-magnesium-silicon type: hardens to some extent on aging at ordinary temperatures, but is hardened to a further, and practically very important extent, by artificial aging. One alloy worked with contained 1 per cent magnesium and 0.6 per cent silicon.

Both of these types possess decidedly better working qualities than duralumin. The combination of copper and magnesium in aluminum seems to lead to comparatively poor working qualities, as in alloys of the duralumin type.

ETCHING ALUMINUM AND ITS ALLOYS FOR MACROSCOPIC AND MICROSCOPIC EXAMINATION

By Fulton B. Flick, New Kensington, Pa.

A combination of hydrofluoric-hydrochloric acid solutions was experimented with, with most gratifying results. The solution finally adopted as standard consists of: 90 c. c. water, 10 c. c. concentrated hydrofluoric acid, 15 c. c. concentrated hydrochloric acid; this results in the following percentages by volume: 8.7 per cent. concentrated hydrofluoric acid solution, 13.0 per cent. concentrated hydrofluoric acid solution.

The use of such a solution reveals the grain size of aluminum in an excellent manner. The specimen, cleaned by swabbing with alcohol if it is greasy, is immersed in the solution. If the specimen is too large, the solution may be poured over it and allowed to react for a few minutes. At short intervals, the piece is removed and washed with hot water, the structure is examined and the

process repeated until the desired effect is obtained. In general, satisfactory etching requires from 30 to 90 sec.

SCRATCH AND BRINELL HARDNESS OF SEVERELY COLD-ROLLED METALS

By M. F. Fogler and E. J. Quinn, Chicago, Ill.

An attempt to duplicate Rawdon and Mutchler's experiments showing a reversal of hardness with continued rolling gave negative results, indicating that the phenomenon is not general but depends, probably, on local conditions of rolling.

The Brinell results for both copper and iron show an increase in hardness on cold rolling, up to a certain point when the Brinell number becomes constant. The only place where a slight decrease is indicated is in the thinnest samples. A close examination of these samples will show that a sharp Brinell impression is not obtained, but all of the metal in the vicinity gives a little thus giving a dent rather than a sharply outlined Brinell impression. This tends to give a larger apparent diameter of the impression and thus a lower Brinell number. The data for scratch hardness indicate that on cold work the scratch hardness increases slightly up to a certain point then remains constant, although this increase in hardness is not of the same magnitude as that of the Brinell.

These results indicate that a reversal of hardness, as found by Rawdon and Mutchler, does not occur under all conditions of commercial rolling practice; and in view of the fact that previous investigators have not found such a reversal, it seems not improbable that it might be characteristic of the particular rolling conditions prevailing in Rawdon and Mutchler's experiments. It should be noted that the Brinell hardness given for annealed copper by Rawdon was much higher than that usually given, even with a load of 500 kg. on a 10-mm. ball and is very much higher than the value we find. Doctor Rawdon has suggested that the difference between our results and his may be due to a difference of rate of deformation.

EUTECTIC PATTERNS IN METALLIC ALLOYS

By C. H. Green, Minneapolis, Minn.

After a careful consideration of the literature on eutectics, especially of the two most important recent papers, it appears that there is no disagreement in the results. The morphological classification is far more comprehensive but consideration of surface tension gives added weight to certain groups. In the few instances noted, where it seems the form does not correspond to surface tension values, some other property is probably in control. Portevin's Type I, regular crystals, easily covers Brady's crystalline class and is not often found. Every example of Brady's globular and lamellar classes forms eutectic colonies and differs in different parts of the same specimen as to whether the central particles of the colony are globular or appear lamellar. Type II, dendrites, covers all of Brady's 3A class and probably his 3B class. The following classification is suggested:

Type I. Regular crystals.

Type II. Dendrites or skeleton crystals. Angular arrangement. (One metal has a low surface tension or high cohesion. One constituent retains its own crystal form, and acts as the predominant partner. Successive crystallization.) Examples, Bi-Pb, Bi-Sn, Pb-Te, etc.

Type III. Eutectic colonies or complex grains. Spherical or spherulitic. (Metals of high or medium surface tention. Simultaneous crystallization.) Central particles rounded, dotted, parallel straight or wavy sheets, rods; possibly angular or triangular.

Examples, Cd-Sn, Cd-Zn, Te-Sn, Mg-Sn, Pb-Sn, As-Sn, Al-Zn, etc.

Type IV. Conical arrangement of one phase in a ground mass of the other.

Examples, Sn-Zn, Sb-Te, Bi-Te; possibly Sb-Cu_2Sb.

CORROSION OF COPPER ALLOYS IN SEA WATER

By W. H. Bassett and C. H. Davis, Waterbury, Conn.

A 10-year, sea-water, corrosion test of tubes of several copper alloys has shown that many alloys withstood attack by solution, pitting, and dezinkification; a 1-year, salt-spray test of sheet-metal specimens of the same composition showed the same results.

CONCLUSIONS

Tubes of many alloys successfully withstood the 10-year attack of the sea water by solution, pitting, or dezinkification. In order to select or to predict those that would be the best, it will be necessary to rely on visual and microscopic examination (where the personal element is introduced) as well as on the loss in weight data supplied by sea-water and salt-spray tests on small sheet-metal specimens of similar composition. It is apparent that a selection of material best suited to resist salt-water corrosion should avoid the tendency toward both pitting and dezinkification. The copper-zinc series should be homogeneous alpha brass of the region between 70 and 85 per cent copper. If tin can be added to these alloys, so as to become a part of the solid solution, no apparent harm is done. In fact, previous investigations as well as practical service conditions have tended to show that in many cases the addition of tin to alloys for use with salt water was beneficial. For instance, in this experiment, the length of life of a Muntz (60 per cent copper and 40 per cent zinc) type of tube was increased from 2 to more than 10 years by the addition of tin (Tobin bronze).

Tinning or tin-plating in a commercial manner the inner surface of the tubes appears to retard the corrosion of Muntz metal for a month or two but, in the case of 70-30 copper-zinc alloys, the presence of tin on the surface has caused severe dezinkification and failure. Furthermore, tinned Admiralty tubes in harbor and sea-water service, in several instances brought to our attention, failed by dezinkification and deep pitting. Rather than tinning the condenser tubes, it would be considered better practice to choose the alloy best fitted to withstand the service conditions.

Of the other alloys, those that appear to be serviceable include the copper-tin mixtures of the alpha region and the cupro-nickels and copper-nickel-zinc alloys. The bronzes (Cu-Sn) do not become pitted but dissolve slightly and evenly, the losses in weight being somewhat greater than those of the better brasses. The bronzes and nickel alloys rank together in this respect, both the sheet and tube samples being in good condition at the end of the test.

Of the nickel alloys, the copper-nickel-zinc specimens formed a firmer corrosion scale, which was protective and did not easily flake off—that upon the cupro-nickel (Cu-Ni) came off easily, especially on drying, which fact apparently explains the greater loss in weight of those specimens. The nickel alloys dissolved evenly and did not become pitted but they appear less suitable for condenser tubes than the best of the brasses. They lose more in weight, cost more, and are more difficult to manufacture; hence are more liable to faults than the brasses of the 70 to 80 per cent copper region. These last considerations likewise apply to the bronzes (copper-tin).

The alloys unsuitable for condenser tubes would include the brasses above 85 per cent copper, those below 70 per

cent copper, manganese bronze, and aluminum bronzes. Pitting or dezinkification causes tubes of these alloys to fail rapidly.

The brasses best fitted by composition for use with sea water resist corrosion to the fullest extent when finished with a 10 per cent reduction following a 650° C. anneal (½ hr. annealing period). Considering annealed specimens only, the brasses were at their best with a 550° to 650° C. anneal, whereas the brasses containing tin, including the Admiralty alloy, were most resistant at the 450° C. anneal. Apparently a slight reduction (10 per cent) gave the metal a more perfect surface and, consequently, slightly better corrosion resistance, than that which resulted from annealing. This point was noticed especially in the behavior of the sheet specimens during the first year; it was also found that the loss was greater with the higher anneals than with those at a lower temperature. It should be noted that the annealing of Munz metal usually produces a surface layer of alpha crystals, which have the practical value of resisting corrosion during the first month or two; after that time, however, the beta grains are reached and action progresses rapidly.

DISCUSSION

W. B. Price read a written discussion in which he complimented the authors on the remarkable scope and carefulness of the work done. He pointed out, however, that some of the conditions which a condenser tube must stand under actual operations were not covered by these tests. The variable speed of condenser water, the lodgement of foreign matter and other conditions could hardly be covered in a test installation. **Mr. Price** stated that condenser tubes as now manufactured were better than they had ever been, and that if in some cases their life seemed short, it was due to the greatly increased demands made upon them.

A representative of the New York Edison Company stated that the life of condenser tubing had been increased from 2 to 8 years since the improved Admiralty metal tubes had been adopted.

W. R. Webster also read a written discussion covering in detail a number of the points made by the authors. Among other things he disagreed on the question of the value of a ten per cent draw after the final annealing.

Professor White pointed out that in the life of condenser tubes, the actual operation of the condensers played a most important part. He advocated investigation into the method of operating condensers to be carried on along with the work of improving the material in the tubes.

TANTALUM, TUNGSTEN AND MOLYBDENUM

By E. W. Engle, North Chicago, Ill.

The information contained in this paper is partly a general compilation from various sources and partly information obtained as a result of recent years of work in the laboratory of the Fansteel Products Company. It covers the physical properties, uses, metallography and chemical properties of tantalum, tungsten and molybdenum.

X-RAY EVIDENCE VERSUS THE AMORPHOUS-METAL HYPOTHESIS

By Robert J. Anderson, Boston, Mass., and John T. Norton, Cambridge, Mass.

The diffraction of x-rays by cold-worked and heavily polished surfaces of metals gives no evidence of an amorphous state and typically perfect crystallographic diffraction patterns are obtained. Severely cold-worked metals, reduced as much as 98 per cent in area, give true crystallographic diffraction patterns, and polished surfaces of large single crystals of metal give typical crystallographic patterns. The conclusion is drawn, on the basis of x-ray evidence, that metals are fragmented on cold work and polishing and not amorphized.

RÉSUMÉ AND CONCLUSIONS

The effects of cold work, polishing, and anneal on the appearance of the x-ray diffraction lines given by a number of metals and alloys have been discussed, and the evidence obtained indicates that metals are not amorphized by cold work or polishing. The paper may be summarized briefly as follows:

1. Two methods for taking x-ray diffraction patterns of metals have been described and their advantages over the powder method pointed out.
2. Severely cold-worked metals, reduced as much as 98 per cent in area, give true crystallographic diffraction patterns.
3. The appearance of the lines in the Hull diffraction pattern is affected by the grain size of the metal.
4. Cold-worked (finely fragmented) metals give sharp solid lines in the pattern, owing to the overlapping of reflections by a great multiplicity of atomic planes oriented at suitable angle to the beam of x-radiation.
5. Annealed (coarse-grained) metals give dashed lines in the pattern, owing to separate reflections from few atomic planes suitably oriented to the radiation.
6. The polished surface of a piece of metal when used to diffract x-rays gives sharp solid lines in the pattern, this indicating a fine-grained structure.
7. The fact that polished surfaces of metals give crystallographic diffraction patterns shows that there is not a vitreous amorphous film in the surface but simply a great multiplicity of crystal fragments.

DISCUSSION

This paper was presented in abstract by **Zay Jeffries** in the absence of the authors. **Dr. Jeffries** discussed the paper in detail, agreeing with points 1 to 6 inclusive, noted above, and remarking that they were already standard information. With regard to point 7 he stated that the x-rays showed the presence of crystals. They did not, however, prove the absence of vitreous amorphous material. This vitreous amorphous material is generally conceded not to be hard enough to prevent deformation, as is evidenced by the fact that he and his associates had increased the length of material by cold working over 300,000 times. This did not mean, however, that no vitreous amorphous material was present. X-rays might not show either its presence or absence, particularly in the case of a polished surface.

Dr. Bain read three written discussions, one of which agreed with **Messrs. Anderson** and **Norton,** while the other disagreed with them. **Dr. Bain** stated that the paper was clear evidence of an excellent piece of work carefully done. It had not actually proved the non-existence of the amorphous phase; it had simply shown that very fine crystals had been formed, due to cold working. It was not made clear that these crystals were not embedded in a ground mass of the amorphous phase.

Dr. Benedicks spoke, giving his opinion that the amorphous theory was only a theory, and as such it was useful only so long as it explained certain otherwise inexplicable phenomena. As soon as these phenomena were explained by concrete facts or simpler theories, there was no longer any need for the amorphous theory. It was his opinion that the authors had not actually disproved the theory of the amorphous phase. It was difficult, if not impossible to do so, for the reason that it was always difficult to prove the absence of a material, particularly of such character as the vitreous amorphous phase is supposed to be. It was his opinion, however, that this theory was no longer needed and therefore, could no longer be held.

Dr. Hayward stated that he had discussed this particular point at great length with Mr. Anderson and had pointed out the absence of really definite proof of his claim. **Mr. Anderson** had admitted this fact, but had stated that the burden of proof was in reality on the advocates of the amorphous theory.

THE MALLEABILITY OF NICKEL

By Paul D. Merica, New York, N. Y., and R. G. Waltenberg, Bayonne, N. J.

The investigation here reported was taken up in the summer of 1921 with the specific purpose of ascertaining: (1) why ordinary cast nickel is not malleable, when not treated with magnesium, and (2) what is the mechanism by which the magnesium treatment produces malleability in such nickel. Such an investigation has, of necessity, embraced a considerable study of the metallography of nickel and some of its alloys, and has brought to light some interesting facts only indirectly related to the principal themes. Of these, perhaps the most interesting are the results of the study of the equilibrium between nickel and nickel oxide.

The principal conclusion reached from the results of these tests was an unexpected one. Of all the impurities known to be present in furnace-refined nickel only sulfur rendered pure electrolytic nickel non-malleable—that is, of course, when added in amounts not greatly exceeding the usual ones. As long as the sulfur content of the electrolytic nickel ingot was well below 0.005 per cent the ingot was malleable. Whenever it reached or exceeded that amount, the ingot became non-malleable and its quality was impaired in proportion to the amount of sulfur present.

The addition of such elements as carbon, silicon, iron, copper, arsenic, cobalt, manganese, and, to our surprise, oxygen did not impair the malleability, either hot or cold, of the remelted electrolytic nickel ingots. Nor did drastic exposure of such nickel to the action of carbon monoxide, carbon dioxide, hydrogen, or air affect the malleability of the nickel, except in so far as the presence of blowholes in the resulting ingot in some cases produced slivers and splits.

The experiments were sufficiently extensive, in our opinion, to allow of but one conclusion: that the lack of malleability of ordinary furnace-refined nickel is due solely to the presence of sulfur in excess of the safe limit—less than 0.005 per cent. This was demonstrated to be true in similar manner for monel metal (containing about 67 per cent nickel and 28 per cent copper) and it is suspected that it is characteristic of nickel alloys, at least those of higher nickel content.

Contrary to general belief, nickel that is free from sulfur but contains nickel oxide up to the eutectic composition is quite malleable, both hot and cold. As a demonstration of this, a 1-in. diameter ingot of the eutectic composition was forged hot to a 0.25 in. diameter bar and this bar was drawn cold, with intermediate annealing, after about 80 per cent reductions to a satisfactory wire of 0.009 in. diameter.

RECRYSTALLIZATION AND GRAIN GROWTH IN SOFT METALS

By Maurice Cook and Ulick R. Evans, Cambridge, England

A procedure of obtaining specimens of lead, tin, and cadmium with a moderately equiaxed structure and a smooth surface suitable for etching without grinding and polishing is described; the advantages of general oblique illumination (as opposed to vertical illumination) in the photomicrography of pure metals are stated. Using these methods, a statistical study of the changes brought about in deformed lead, on annealing, has been made. The common mode of structural change was found to be recrystallization. Cases of growth of one original grain into another were rare; but if a totally recrystallized specimen was annealed above 200° C., a few large grains appeared and spread over the whole area, except for a certain number of small grains which remain unabsorbed. The temperature needed to produce structural change in lead was found to be lower, the greater the degree of deformation. With tin, an extension of 28 per cent caused practically no recrystallization at ordinary temperatures, but recrystallization occurred if the specimen was heated to 100° C. In cadmium at low temperatures, the grain size decreased in marked manner as the deformation increased; but at high annealing temperatures, the grain size was comparatively independent of the degree of deformation.

DETERMINATION OF STRUCTURAL COMPOSITION OF ALLOYS BY A METALLOGRAPHIC PLANIMETER

By E. P. Polushkin, New York, N. Y.

The object of this paper is to show that the structural composition of an alloy may be found by the planimetric measurement of the total area occupied by each of the constituents on a few representative photomicrographs of this alloy. When the area is determined the volume and the proportional weight of the constituent may be calculated. This method has been used for the determination of the structural composition of binary eutectics and other binary alloys with known constituents; also the composition of unknown constituents in binary alloys. The accuracy of the method is high enough to justify its application to metallographic problems instead of the chemical analysis.

Mottled Finish on Steel

Q.—Can you describe a process for obtaining a mottled effect on mild steel parts that can be employed for quantity production?

A.—For best results the pieces should be polished. After polishing all grease should be removed from the parts by boiling in a strong soda solution. The pieces are next heated in a cyanide bath to a temperature of about 1,380 deg. F. A pyrometer should be employed to insure that the temperature is maintained, but not exceeded. Care must be taken to avoid any oxidation. The quenching bath should be agitated by an air pipe carried down inside the bath and turned upward about 6 inches from the bottom.

Quenching baths should consist of 6 pounds saltpeter; ¼ pound of permanganate of potash; 1 pound of cyanide of potash; 2 pounds of common salt, and 4½ gallons of water. For best results, soft water should be used. The pieces, on being removed from the heating bath, are plunged immediately into the center of the stream of bubbles coming up from the bottom of the quenching bath tank. The salt in the solution is important on account of its action in splitting up the surface of the mottling. The air in the solution produces a globular marking.

To obtain a herringbone effect in the mottling the pieces are quenched in the same part of the bath with a quick upward and downward motion of the piece working it downward toward the bottom of the bath at the same time. To accentuate the colors the work is finally boiled in oil for ten minutes. This has the effect of adding permanence to the coloring.—P. W. Blair.

Tests for Molding Sand

A Resume of the Tentatively Adopted Methods of Tests Developed by the Joint Committee on Molding Sand Research of the American Foundrymen's Association. Part 1.

Compiled for The Metal Industry by ADOLPH BREGMAN, Managing Editor

Early in 1921 conferences in the American Foundrymen's Association began to discuss the lack of standardized testing methods for sand, preventing satisfactory selection and control by foundrymen, an evil of long standing. Through the co-operation of the American Foundrymen's Association, the National Research Council, the American Society for Testing Materials, the Joint Committee on Molding Sand Research was organized and a number of committees appointed.

It is interesting to note the ramifications of the work of this Joint Committee. There are 48 members in all, 24 of whom are foundrymen, 6 each from the gray iron, steel, malleable iron, and non-ferrous branches of the industry; 6 are sand producers; 10 are metallurgists, engineers or physicists; 5 are geologists, and 4 are refractory and ceramic experts. These men are drawn from the three organizations mentioned above and the Bureau of Standards, the Bureau of Mines, the Geological Survey, and the Canadian Department of Mines.

So far the research has consisted mainly of developing satisfactory methods of testing as developed during the past year, and laid out for the next year will specialize on three essential tests, namely:

Six methods of testing have been tentatively adopted for one year's trial.

1. Bonding strength or cohesiveness.
2. Fineness.
3. Permeability.
4. Chemical analysis.
5. Dye adsorption.
6. Method of sampling.

Comments are earnestly requested by the Joint Committee and it is emphasized that these methods which will be outlined below are not the final word on the subject. They are simply offered for consideration and for criticism in order that perfect methods may be developed from them.

GEOLOGICAL SURVEYS

The Geological Survey investigation was undertaken in order to locate sands in various parts of the country so that foundries could be supplied by local deposits, thus eliminating excessive freight costs.

Prof. H. Ries, of Cornell University, the chairman of this committee, recommends strongly that foundrymen in the different states get in touch with their respective state geologist by letter or by personal interview, showing how important it is to obtain sand supplies near at hand, thus benefiting the foundry industry and also the sand industry. If the state geologist claims that he has not sufficient funds, the representatives in the legislature should be approached and asked to provide him the funds for the work.

CONSERVATION AND RECLAMATION

The Subcommittee on Conservation and Reclamation has mailed out a total of 8,777 questionnaires, of which 1,250 went to brass foundries, and 2,200 to aluminum foundries. Altogether 1,548 replies were received, and of these replies, only about 10 per cent contained information that can be considered of value. From the information submitted by these foundries, it was found that Albany molding sands are used by more non-ferrous foundries than any other sand reported, the preference being for grades No. 00, No. 0, and No. 1. Very little testing of sands had been done, most of it being performed by what is known as "touch" or "feel" or by trial on the foundry floor. The sand is stored under cover to prevent washing out the bond by rain, to keep it clean, and to allow it to dry sufficiently on the surface so that it will not freeze in winter, and yet retain the moisture in the interior of the pile. A difference of opinion exists as to the effect of damp aging on the working properties of sand, some saying that it increased the bond, while others claimed that it shortens the life of the sand, making it rough and sticky, and tends to produce pin holes in the casting. Considerable sand is lost, due to the absence of methods of reclamation and the disposal cost is high, averaging $1.50 per ton in the non-ferrous foundries.

New molding sand is used to the extent of about 22 per cent on the average in non-ferrous foundries, but the answers ranged from 2 to 75 per cent.

CORE MATERIALS

Michigan City sand and oil binders are the most popular core materials, linseed oil is the favorite oil binder, kordek and dextrin ranking below it respectively. Very few test their cores, but judge them by touch or observation.

TESTING METHODS

The **bonding or cohesiveness test** is intended to check the bonding qualities on molding sands. The **permeability test** checks the venting qualities of both new and used sands. The **fineness test** gives information on the grain distribution, and is also an accurate measure of the amount of clay substance present. The **chemical analysis** is, of course, self-explanatory, but it is not necessary for most sands, since the majority of shipments are from very well-known sources of supply where investigation has proved that no objectionable constituents are present. The **dye adsorption test** shows up the colloidal matter present in the sand. The **method of sampling** tends to standardize this procedure and to eliminate disputes on shipments.

The following is a detailed description of each of the tests mentioned above, and the equipment necessary to perform them.

Bonding or Cohesiveness Test

TEMPERING OF SAND

In testing sand for cohesiveness it is absolutely necessary that the sand be properly sampled[1] and uniformly tempered. For plant check or control tests upon facing or heap sands in daily use, one may test the sand as tempered for molding.

Since it is the object to determine the maximum cohesiveness under suitable foundry working conditions, in the examination of new sands, experiment should invariably be made with several water contents in order to ascertain that amount (optimum water content) which develops the maximum degree of cohesiveness. It is advisable in most cases to try percentages of water bginning with 4 per cent and increasing by stages of 2 per cent, up to and including at least 8 per cent. The permissible extent of deviation from the predetermined amount should in no case be more than one-half per cent.

[1]Directions given under "Sampling of Molding Sands as Shipped or Delivered" cover this point in detail.

In the examination of new sands, proceed as follows: Dry 1,000 grams of sand (selected according to the directions for sampling molding sand), for one hour at a temperature not below 105° C., nor above 110° C. Care should be exercised to spread the sand over a large area in a thin layer in order to expel all the moisture in a given time. This will make it possible to add the proper amount of water and give the sand the desired moisture content.

After the sand has cooled, measure out the desired quantity of water, adding sufficient extra water (usually from one-fourth to one per cent) to allow for evaporation during mixing. Thus, if it is desired to add 4 per cent water and one-half per cent extra water is needed, one would add 47 cubic centimeters (since one cubic centimeter of water weighs 1 gram) to 1,000 grams, and secure a total weight of 1,047 grams.[2]

For the tempering operation, spread the sand on a smooth flat dry surface in a layer about 1 inch thick, sprinkle a small quantity of the required water evenly over the sand, and work the latter gradually into a heap by rubbing it vigorously through the hands. Again spread it into a thin layer and repeat the above operations, adding more water. Continue to do this until all of the water has been thoroughly distributed through the sand. There should be no dry lumps or other evidence of uneven tempering.

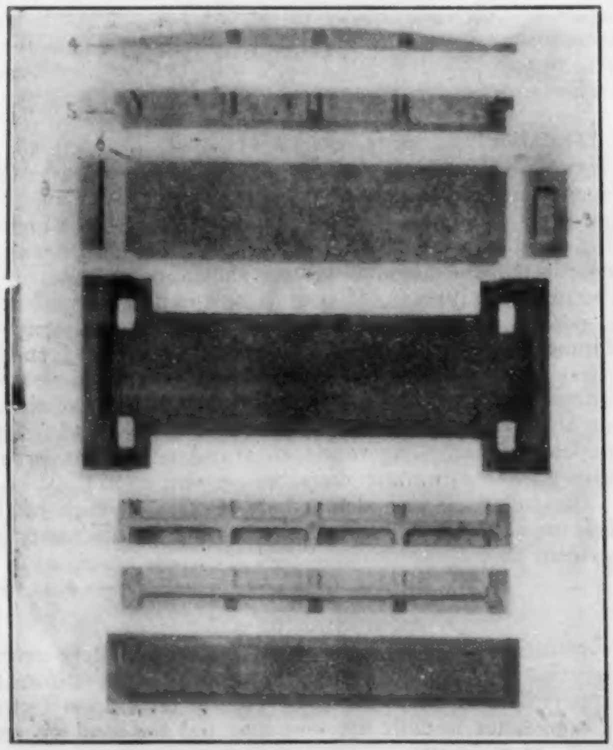


FIG. 1. MOLD BOX PARTS FOR BOND TEST

The sand should now be allowed to stand in order that the maximum temper may be developed. To secure this temper, place the sand in a humidor or air-tight receptacle and allow it to stand for 24 hours. After this, the sample is ready to be tested, as below.

Take the entire sample of sand from the humidor. Pass this entire sample twice through a course riddle and return the sand as quickly as possible to the humidor or receptacle. From this take sample to be tested for cohesiveness; also sample to be tested for moisture content, and for permeability, if desired.

ASCERTAINING MOISTURE CONTENT

The moisture content is to be determined as follows: Dry 100 grams of tempered sand for one hour between 105° and 110° C. When dry, reweigh. The loss of weight in grams is the moisture content expressed as percentage.

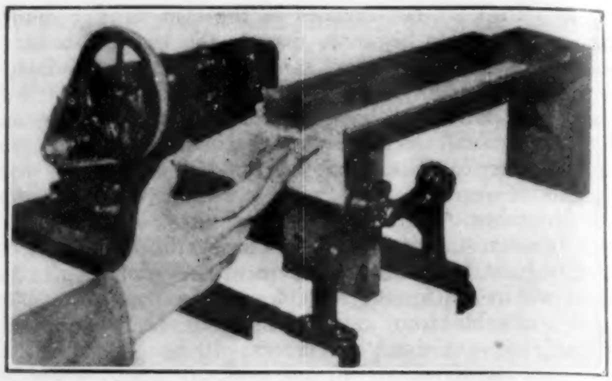


FIG 2. CONSTANT SPEED MOTOR PULLING DEVICE FOR BREAKING BOND TEST BARS

METHOD OF PROCEDURE IN TESTING FOR COHESIVENESS

While the sand is drying, remove all loose pieces from the box, as shown in Fig. 1. Replace metal plate (No. 6, Fig. 1) in frame (No. 1, Fig. 1), locating the plate between the small projections on the bottom of the frame, and upon this plate[3] place a piece of thin waxed or oiled paper which is of the same width as the end of the plate, but long enough to be inserted in the slotted shaft of the motor-pulling device (Fig. 2). One end of the strip of paper should be even with one end of the plate, and the other should project and be turned around the other end of the plate, so as to lie smoothly against its underside. Replace sections 5 (Fig. 1), removing them as far toward the outer edge of the frame as is possible. Then replace sections 3 (Fig. 1). Place the open box directly beneath the riddle which is shown together with the box and strikes in Fig. 3.

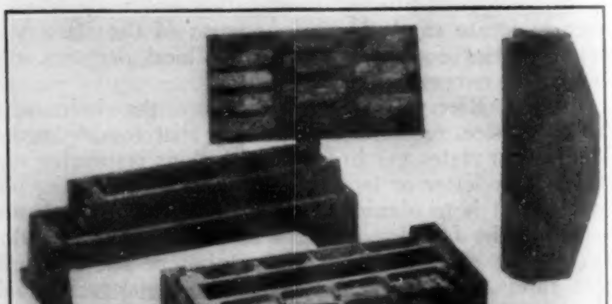


FIG. 3. ASSEMBLED MOLD BOX, SCREEN AND RAMMER BLOCK FOR BOND TEST

Take a sufficient quantity (approximately 1,000 grams) of tempered sand to make a bar one inch thick, with a tolerance of not more than three per cent. Place the weighed sand and some tumbling stars in the riddle, and

[2] **Moisture content for all molding sand determinations and tests is to be expressed as the percentage of moisture in the damp sample of sand. It is not proper to calculate the amount of moisture, proportionate to the weight only of the dry sand.**

[3] **The metal plate can be made of aluminum, brass or of some other non-corrosive metal. The light weight of aluminum makes it preferable for handling.**

shake until the sand has passed through it.[4] Remove the box from beneath the riddle, and brush all particles on top of sides of box, into same.

Level off the sand in the box by using the strikes shown in Fig. 4. In striking off, it is important to start with that strike which grazes the highest level of the sand, working from the center alternately toward the ends of the box, and swinging the strikes around as the ends are approached, so that no sand will be packed between the strike and the end of the box. Continue the use of strikes consecutively deeper by 1/16 inch until a uniform level of sand is obtained throughout the box.

Starting with section 5 on one side of the box, push it toward the center as far as possible, and hold in position by inserting section 4 (Fig. 5). Repeat this operation on opposite side.

Place the trussed rammer (Fig. 7) in a level position on the sand in the box. Place the box with the trussed rammer in an impact machine similar to that shown in Fig. 6, so that the weight will fall on the center of the truss. Drop a twenty-pound weight, three times from a height of sixteen inches.

Remove box with trussed rammer from impact machine. Then remove trussed rammer and sections 4, 5 and 3 in the order named. In removing section 3 be especially careful to push it away from the bar as it is being lifted.

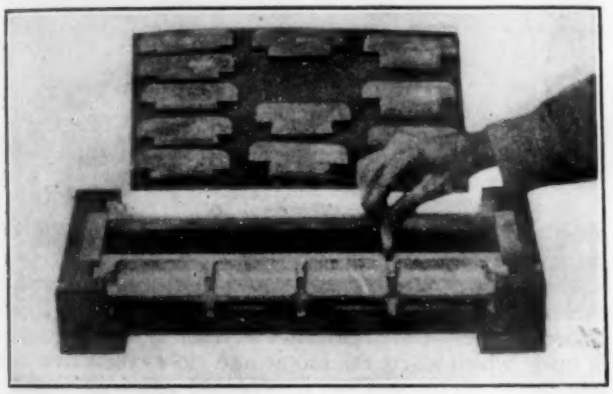


FIG. 4. SHOWING METHOD OF LEVELING SAND IN MOLD BOX USING GRADUATED STRIKES OF GRADUATED DEPTH

Remove metal plate supporting the bar lying on the paper. With a scale divided into hundredths of an inch, measure both sides of the bar at three points to determine the average thickness, considering the inch to be the unit of thickness.

The thickness should be uniform, but experiments have shown that variations in thickness do not appreciably affect the results when the deviations in the thickness of the bar do not vary from the prescribed one-inch dimension, over or under, at any point, by more than .02 inch. Set the plate carrying bar and paper on the table of breaking apparatus (Fig. 2), with one end of the plate projecting about one-half inch beyond the end of table. The free end of the paper should extend from the projecting end of the plate, and should pass through the slot in the shaft of the motor-pulling device.

Start the motor-pulling device[5], which draws the bar forward at the rate of six inches per minute. When the weight of the overhanging section causes a portion of the bar to break off, stop the motor. Catch the portion

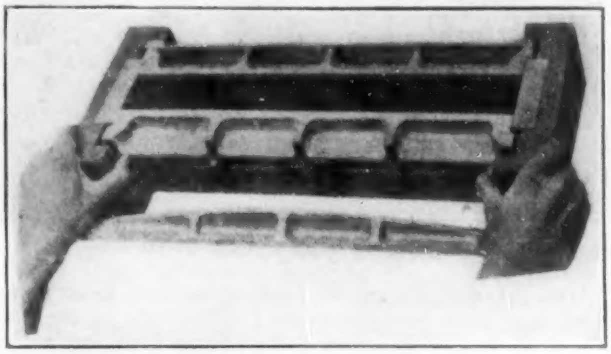


FIG. 5. SHOWING METHOD OF ASSEMBLING MOLD BOX AFTER SAND HAS BEEN RIDDLED IN BOX

breaking off in some convenient receptacle (as illustrated in Fig. 2) which has been previously weighed. This receptacle may be a piece of thin metal which has been bent into a shape similar to a bowl or scoop so as to safeguard the catching of every particle of sand as it falls. Weigh the receptacle and every particle of the broken portion of the bar together, and deduct the weight of the receptacle. Repeat the operation until as many breaks are obtained as the bar will yield. To prevent the last part of the bar from tilting, a broad flat weight of proper size may be placed on the end of the bar to hold it down.

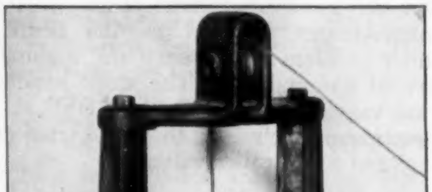


FIG. 6. RAMMING APPARATUS FOR COMPRESSING SAND IN MOLD BOX

DISPOSITION OF RESULTS FROM TESTS

If the bar breaks into portions of fairly uniform weights all breaks may be retained. If the break first differs by more than 10 per cent from the average weight of the others, discard it. Appreciable variations between the weight of the first break and those of the other breaks may be due to the influence on certain sands of close contact with the end of the box (No 3, Fig. 1). Should the weight of any break other

[4]In the case of some coarse sand like Millville gravel there is a tendency for the finer particles to go through the screen of the riddle first, the coarser particles and pebbles passing through later. This tends to give a layered structure to the bar, which is undesirable. Where the sand shows such a tendency the use of a coarser screen in the riddle for feeding the material into the box is permissible.

[5]Instead of the motor-pulling device illustrated, any suitable form of apparatus may be used, which employes power geared to a shaft in such ratio that the said shaft to which the paper is attached will be revolved at a constant speed to draw the bar at six inches per minute. A steady forward movement of the bar for each break is imperative. For intelligent comparison of results a uniform pulling speed, to be employed by all operators, is necessary. A speed of six inches is adopted because it has been found satisfactory with weak and strong sands.

than the first differ from the average weight of the others by more than 10 per cent, discard the entire bar. This difference is usually traceable to improper mixing of the sand or careless use of the strikes.

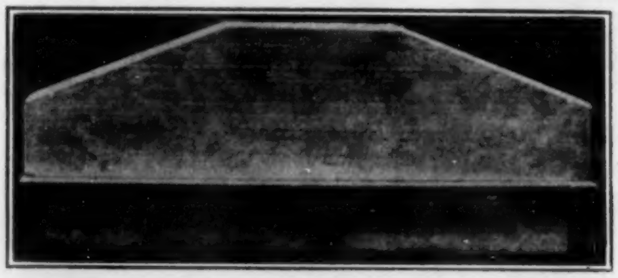


FIG. 6. RAMMER BLOCK FOR BOND TEST

Add the weights of all broken sections (except any which may have been discarded) and divide by the number of these. This gives the average breaking weight for a bar of the thickness used. Repeat this operation, until at least six breaks have been obtained from not less than two bars, and average the results of the average breaks from each bar. If properly carried out, the test of the number of bars as specified should yield an average from which no individual bar should vary more than 5 per cent.

The bonding strength is to be expressed in terms of the actual weight in grams of the average breaking strength of the bar including moisture.

Example A:

Bonding Strength = 213.6 × 100 ÷ 500 = 213.6 ÷ 5 = 42.7 per cent.

Example B

Bonding Strength = 252.9 × 100 ÷ 500 = 252.9 ÷ 5 = 50.6 per cent.

Having completed the test on samples with varying moisture contents, report the bonding strength or cohesiveness of each, with its moisture content.

This article will be continued in an early issue.—Ed.

Japanning Oven Temperature Automatically Controlled

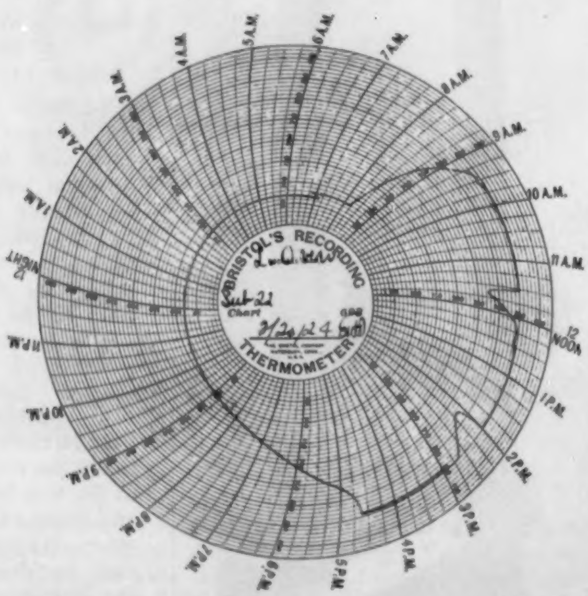
The Use of a Thermometer-Thermostat, a Relay and Controlling Valve to Operate a Japanning Oven Installation

Written for The Metal Industry by C. S. WADHAMS, The Bristol Company

That automatic temperature control can be successfully applied to drying ovens for treating japan and other metal finishes is very forcibly demonstrated by the recording thermometer chart record reproduced here.

The material for this article was secured by the writer from an automatic control installation in the metal finishing department of a well known industrial plant. In this installation, commercial gas is used as the heating medium. Thus, their problem is to secure and maintain the correct mixture of gas and air. The work handled requires temperature varying from 100° up to 500° F.

The controlling equipment includes a thermometer-thermostat with its relay and a controller valve.



DAY'S RECORD FROM RECORDING THERMOMETER

The thermostat is the type operated by the expansion of a gas, and is very responsive to changes of temperature in the oven. The instrument is mounted on the wall a short distance from the oven with a flexible capillary connecting tube leading into the oven where the sensitive bulb is located. The function of the thermostat is first, to measure the temperature in the oven; second, to make and break electrical contacts through the relay switch to operate the controlling fuel valves.

A motor-operated controller valve is installed in the gas and air line leading to the oven. This valve is adjusted for a perfect flame at both low and high settings. It is also properly timed, so that the flame is not affected by changing from low to high or high to low.

In operating, the attendant sets the indicator on the thermostat to the degree of temperature which he wishes to maintain in the oven and then turns on the gas and air supply. A slight increase of temperature in the oven causes the thermostat to make an electrical contact which starts the motor in the control valve. The operation of this motor in turn opens the valve to the high flame. When the desired temperature is reached, another contact is made which starts the motor and closes the valve to the low flame. This process is repeated indefinitely and results in holding to the point set on the thermostat.

As a positive check on the operation of the controlling equipment, a recording thermometer is installed in connection with the oven temperature, so that a constant record is made on the chart of the exact temperature maintained. The chart record shown here is a specimen of the result they are obtaining.

By examining this record it is an easy matter to follow the details of the whole day's run. At 8:15 the work was placed in the oven and gas lighted. It remained there until 11:30 when the doors of the oven were opened, as shown by the record, to take out the first batch and replace it with another. This was again repeated at 2 p. m. That each batch remained in the oven for two hours is also shown by the chart record which gives an absolute check on the entire operation.

In case the fuel supply should fail to function at any time, a safety valve is installed in the line which immediately closes. It cannot be started again unless opened by the operator. This safety device prevents any possible chance of explosion.

To design automatic temperature control equipment much scientific research and technical knowledge is required, but to be successful as a part of everyday industrial plant equipment, all technicalities in operation must be eliminated. This is necessary because the men who are largely responsible for the operation of such equipment are skilled only in their particular line.

Remodeled Electric Furnace

A Comparison of the Old Type Baily Furnace With the Reconstructed Radiant Dome Type

By T. F. BAILY

Nearly a year ago the Michigan Smelting Refining Company of Detroit, one of the first users of the Baily electric brass melting furnaces, decided to remodel one of their 105 K.W. units, converting it into 240 K.W. unit, Radiant Dome Type, built by the Baily Furnace Company

REMODELED BAILY FURNACE

of Alliance, Ohio. This was accomplished by cutting the shell of the old furnace on a line with the top of the door and placing one of the new self supporting resistor units of 300 K.W. capacity on the furnace as shown in the illustration. In order to obtain the additional electrical capacity two of the former 105 K.W. transformers were connected in parallel on the secondary side.

Since the Radiant Dome Type resistor unit is self-supporting, the usual piers for trough support were eliminated and a new hearth composed of grain magnesite and open hearth slag was sintered into place. The elimination of piers allowed an increase of hearth capacity from 1,500 lbs. to 3,200 lbs.

A comparison of the capacity and power consumption of the furnace before and after remodeling is given below in the table. These figures are based on 24 hours operation on substantially the same analysis of metal, which was approximately 70 per cent copper, 5 per cent tin, 22 per cent lead and 3 per cent zinc. On account of foundry conditions the time for charging and pouring, averaged 45 minutes per heat, but had it been possible to reduce this time, the capacity and economy of the new furnace would have been still further increased.

COMPARISON OF BAILY FURNACES

	Furnace before reconstruction	Furnace after remodeling—Radium Dome Type
Electrical Input	105 K. W.	240 K. W.
No. of hours operated per day	24	24
Average number of heats per day	8.15	10
Average weight per charged	1,560 lbs.	3,066 lbs.
Average time per heat	2 hr. 56 min.	2 hr. 24 min.
Capacity per hour	500 lbs.	1,328 lbs.
K. W. hr. per ton while melting	447	308
K. W. hr. per ton including heat up over Sunday	503	330

It is to be noted that the capacity per hour was increased 2.6 times the former capacity and that the power consumption was reduced 170 K.W. per ton, when taking into consideration the heat-up over Sunday. The charges on the old type furnaces contained 54 per cent borings while on the remodeled furnace the charges contained 66 per cent borings.

Cored Bronze Casting

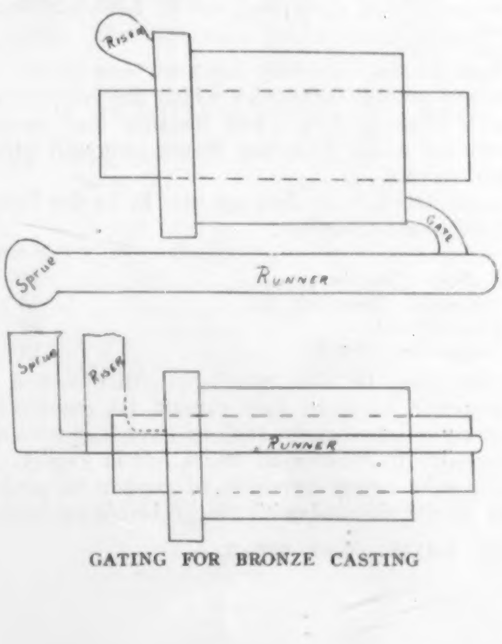
Q.—We are making some castings, like the illustration, of Tobin Bronze, weighing about 13 lbs. each, and would like to have you advise us as to proper gating.

The pattern is split in half, has a 2-in. core, and we have placed a large riser on the flange, but have trouble with shrink holes under the riser. The castings do not machine up clean.

Would you advise that the metal be poured at a bright heat or after metal has stopped smoking?

A.—We suggest this bronze be poured and molded similar to Manganese bronze. Gate and riser like sketch. Tobin bronze is not very good casting metal; in fact, it is a rolling metal, and we suggest as a substitute for this metal, and one that will cast well use a mixture of 58% Copper, 41% Zinc, ½% Aluminum.

Melt the copper first; get it good and hot; add the zinc a little at a time and stir well. Then add the aluminum and pour, as you suggest, at a bright heat after the metal has stopped smoking. Whether you use this mixutre or not pour as indicated and gate and riser as per sketch.
—W. J. REARDON.



GATING FOR BRONZE CASTING

Solders Containing Cadmium

Their Properties, Preparation and Uses

Written for The Metal Industry by N. F. BUDGEN, Birmingham, England

During the late war when there was a general shortage of tin, experiments were conducted both in the United States and in Germany with a view to substituting cadmium for part of the tin in solders. Some of the results were distinctly encouraging. The higher melting point of some of the solders was a disadvantage but for certain purposes, solders with a relatively high melting point have applications where this property is desirable; such for example as the soldering of commutator leads in electric motors. A solder containing 8½ per cent cadmium and 91½ per cent lead has a relatively high melting point, the fusion range being from 249° C. (commencing) to 280° C. (complete). This solder has a maximum breaking strength of about 3,600 lbs. for a half inch round butt soldered join[1].

The following tests show the relative strength of joints soldered with lead-cadmium alloys, and pure tin at various temperatures.

The tests were made by pulling apart two copper rods half an inch in diameter which had been soldered together end to end.

The strengths of the joins are expressed in pounds necessary to pull apart a union of 1 square inch surface.

The tests at elevated temperatures were made by immersing the soldered pieces in an oil bath. The 8 to 9 per cent cadmium solder seems to be best, cost as well as strength being considered.

RELATIVE TENSILE STRENGTHS OF LEAD-CADMIUM SOLDERED JOINTS

Cadmium Percent.	Melting Range	Pounds per sq. inch Breaking Strength of Join at: 20°C.	110°C.	150°C.	290°C.	240°C.
2	290-320°C.	8,920				
2-5	270-300	9,700				
4	249-295	13,000				
6	249-285	13,250				
7	249-280	12,730				
8	249-278	16,650	10,350	5,650	3,570	2,080
8-5	249-275	17,300				
9	249-274	16,800				
10	249-273	14,000	6,120	5,540	3,030	
20	249-259	12,350				
30	249-260	16,800				
50	249-273	12,380				
75	249-280	11,200				
Pure Tin	232°C.	14,100	6,450	5,350	3,770	1,530
Pure Lead	237°C.	7,130				at
Pure Cadm.	321°C.	6,620				230°C.
Half & Half	180°C.	14,800				

There are several difficulties which are encountered in the use of these solders. For instance they cannot be used with the usual soldering fluxes although glycerine gives fair results.

The most satisfactory flux appears to be the following mixture of fused chlorides:

	Per cent
Sodium Chloride	11
Potassium Chloride	14
Zinc Chloride	65
Ammonium Chloride	10

This flux may be used sparingly either melted or in dilute aqueous solution, but cannot be employed for soldering complicated parts such as electric motors where it is impossible to remove all traces left in excess.

Metallic salts cause corrosion of copper on prolonged exposure to the air, and with zinc chloride the corrosion takes place in a very short time, such mixtures are therefore undesirable.

Furthermore the solder does not flow well on cold copper and it is necessary to heat the work rather hot which may cause oxidation.

The cadmium begins to oxidize at about 30° C. above the melting point of the solder; consequently it is necessary to maintain a very even temperature if the solder is to be used in a soldering pot, and under ordinary shop conditions such use would not be practicable (Luckey, Chem. Met. Eng., June, 1920, p. 1041).

The addition of a very small amount of zinc or tin to lead-cadmium solders has been found to diminish the tendency to oxidation, and for this reason such solders are preferred where cadmium is to be one of the components.

The solder largely employed by the Germans had the following composition:

	Per cent
Cadmium	10
Tin	10
Lead	80

For electrical joints, on roofing materials and in the manufacture of tin cans and motor car radiators this solder gives every satisfaction; the tensile strength being about the same as ordinary 40-60 solder but the ductility nearly double.

The point of complete liquation is only slightly higher than that of ordinary solders while the solidification range is considerably greater.

The alloy must be carefully melted as it is very liable to burn. On account of the preponderance of lead, the cost of the solder is very reasonable and its adoption represents a saving of two pounds of tin for every pound of cadmium used (Burgess & Woodward, U. S. Bureau of Standards).

The properties of the alloys containing:

	Per cent
Cadmium	10
Tin	5
Lead	85

are also likely to be good, but the first-mentioned solder is the better known of the two.

Three other solders not intended for economy of tin are composed as follows:

Cadmium	Lead	Tin	Melting Point
8	33	79	136° C.
25	15	70	132°
25	25	50	149°

As already indicated earlier in this article the use of straight lead-cadmium solders is complicated by the ease with which cadmium oxidizes but the tddition of tin or zinc appears to reduce this tendency toward oxidation so that such mixtures can readily be used for iron soldering and if precautions against overheating are taken they may be employed in pot soldering. Hill[a] recommends as superior to the lead-cadimum-tin mixture a solder composed as follows:

Lead	90.8 per cent
Cadmium	7.8 per cent
Zinc	1.4 per cent

[1] U. S. Pat., 1,333,666. March, 1920.

[a] Research Laboratory Westinghouse Electric & Manufacturing Company.

Zinc is only slightly soluble in lead-cadmium mixtures but in preparing this alloy with the addition of so small an amount of zinc, no difficulty is experienced if the ordinary precautions of solder mixing be taken.

This solder is stronger that the lead-cadimum-tin alloy especially at temperatures above 25° C. At 100° C. it is from 50 to 100 per cent stronger than ordinary half and half lead-tin solder and about 30 to 50 per cent stronger than pure tin.

This strength at high temperatures is of value in soldering apparatus that will become heated from one cause or another, such as articles which are to be japanned or are heated by steam.

In this respect the lead cadmium-zinc solders are much superior to the lead-cadmium-tin solders.

The latter cannot be fluxed well without the use of some such salt as zinc chloride, when the resulting join is stronger than that obtained by the use of resin or glycerine as a flux; the former are best fluxed by a mixture of resin, ammonium chloride and alcohol but fused chloride[7] are satisfactory. With zinc-lead-cadmium alloys, tin cans have been successfully soldered without the use of any flux whatever, this is an undoubted advantage as in many cases, especially with copper, the effect of excess flux left on the article after soldering is destructive or objectionable. The solder takes well on tin, zinc, copper and iron, and galvanized sheet.

A solder containing:

	Per Cent
Lead	87.5
Zinc	5.0
Cadmium	7.5

has also been recommended, which on account of its higher freezing range (235°-368° C. instead of 237°-267° C.) has a superiority for certain purposes over the mixture previously discussed. The tensile strength is not increased by the addition of excess zinc but the cost is somewhat raised.

As a wiping metal the lead-cadmium-tin solder is best, but not equal to ordinary tin-lead solders as the freezing range is not sufficiently prolonged; all other cadmium solders are useless for wiped joints as they burn the wiping cloth and are not tenacious in the plastic state.

PHYSICAL PROPERTIES OF TIN, LEAD, CADMIUM SOLDERS[2]

Initial Freezing Point °C.	Final Solidfication Point °C.	Tin	Per Cent Lead	Cadmium	Specific Gravity	Tensile Strength, Pounds per sq. inch	Elongation Per cent on 2 inche	Equivalent Volume to 1 Vol. of 50-50 Solder
210[3]	149[3]	50	50	..	8.81	5,698	20.3	1.00
238[3]	149[3]	40	60	..	9.47	5,820	26.0	1.07
245[3]	149[3]	37.5	62.5	..	9.54	5,383	28.8	1.08
267[4]	249[4]	..	90	10	11.09	5,000	37.5	1.26
254	143	10	80	10	10.35	5,727	52.3	1.17
257	141	5	85	10	10.67	....	...	1.21
...	...	15	75	10	10.26	5,880	41.7	1.16

[2]The tensile properties given are the average of four determinations made on a Scott testing machine, the rate of separation being about 12"/minute.

[3]Rosenhain and Tucker, Phil. Trans., A, 209, 1918, p. 89. Royal Soc., London.

[4]Kapp, A. W., Drude's Ann. der Phys., 1901, 6 p. 754.

[7]The Electrolytic Zinc Company of Australasia find zinc chloride alone forms the best flux, the solder flowing less readily when resin is used.

PREPARATION OF SOLDERS

The best method for preparation of these ternary alloy solders which is practically the same as in the case of ordinary tin-lead mixtures is as follows:[8]

Alloy Mixture	Lead %	Cadmium %	Tin %	Zinc %
1	90.0	10.0	...	..
2	80.0	10.0	10.0	..
3	90.8	7.8	...	1.4

The lead is melted first and when completely liquified a little resin as flux, is added. The metal is thoroughly stirred and any dross which may form and collect on the surface, is removed. In the case of numbers 2 and 3 the tin and zinc respectively are now added and well mixed in. On addition of the cadmium the combined metals are stirred for about 1 hour with occasional additions of flux when necessary. This very long period for stirring has been found essential in order to ensure homogeneity of the resulting alloy; but, if the cadmium be added in small pieces and well stirred during the mixing and melting stages the period may be somewhat shortened.

After careful mixing there appears to be no tendency toward segregation.

Oxidation is not excessive when the cover of resin is maintained upon the metal, even at temperatures of about 450° C. but without the flux, oxidation is rapid at this temperature and 50 per cent of the batch may soon be lost as oxide. The number 3 solder on account of the slight

[8]Information from The British Metal Corporation, London.

RELATIVE COSTS OF 100 POUNDS EACH OF LEAD-CADMIUM; LEAD TIN AND LEAD-CADMIUM-TIN SOLDERS.

	Lead 90 Cadmium 10	Lead 50 Tin 50	Lead 60 Tin 40	Lead 80 Tin 10 Cadmium 10	Lead 92 Cadmium 8
With lead at 4d (8 cents); tin at 3/4d (80 cents); and cadmium at 6/3d or (1.50) per lb., prices in 1918 were:		£9-3-4 (44.03)[9]	7-10-0 ($36.83)	6-1-0 ($29.44)	3-19-0 ($19.41)
Before the war....		3-19-6 ($19.70)	3-7-0 ($16.70)	3-3-0 ($15.10)	2-3-9 ($10.50)
In 1923............	£4-11-8 ($22.00)		2-12-5 ($12.50)	3-10-0 ($16.50)	

[9]Taking one dollar = 4s/2d.

solubility of zinc in the mixture, is best prepared by adding the zinc to the lead and ensuring its dissolution before adding the cadmium.

MISCELLANEOUS SOLDERS CONTAINING CADMIUM

An alloy containing:

Antimony	25 per cent
Cadmium	25 per cent
Tin	50 per cent

is very satisfactory as a solder for Britannia metal, pewter, antimonial lead and the like.

In preparing it, the metals are melted together in the presence of a small quantity of flux (ammonium chloride) and well stirred before pouring. The melting point is 144.5° C. or about 30° C. lower than the best soft solder (2 tin, 1 lead).[9]

A zinc-cadmium alloy containing 15 parts of cadmium and 20 of zinc has been recommended as a soft solder for aluminium-bronze; no flux is required and it is only necessary to scrape the parts to be soldered, bright and clean.[10]

An Austrian patent solder for aluminium consists of 13 parts cadmium, 1 part tin, and 6 parts zinc;[11] and a solder for the same purpose advocated by Roeder contains cadmium 50 per cent, zinc 20 per cent, and tin 30 per cent,[12] or it may contain only cadmium and zinc in the proportions 42.9 per cent, and 57.1 per cent respectively. Many so-called "fusible alloys" having very low melting points and usually being ternary or quaternary alloys of lead, tin, cadmium and bismuth, are suitable as soft solders for soldering lead, tin, or Britannia metal.

Some such alloys are as follows:[13]

Specific Gravity	Cadmium Per cent	Lead Per cent	Bismuth Per cent	Melting Point
10.529	7.1	42.7	50.0	88° C.
10.563	18.7	50.0	50.3	89.5° C.
10.732	15.4	53.8	30.8	80° C.

Another series contain.[13]

Cadmium	Tin	Bismuth	Melting Point
16.66	33.34	50.00	66° C.
12.50	37.50	50.00	66° C.
25.00	25.00	50.00	66° C.

An alloy supposed to be very suitable for brazing copper contains 29 to 38 per cent of cadmium and 57 to 65 per cent of silver.[14]

[9] Mining Journal, 1907, p. 573.
[10] Mining Journal, loc. cit.
[11] Austrian Pat., 71,088; 1916.
[12] Mining Journal, loc. cit.
[13] Mining Journal, loc. cit.
[14] Fuller, T. S., U. S. Pat., 1,215,138; 1916.

Rust Resisting Nickel*

Nickel plated iron and steel articles produced commercially today carry a layer of nickel usually about .0001 in. thick, which is inadequate to provide substantial protection against rusting for any length of time. Thin coatings of nickel are generally porous and corrosion of the base metal soon sets in through the pores of the coating, producing the well-known unsightly rust spots, which appear on nickel plated steel usually after about one year.

Professor E. M. Baker, of the University of Michigan, shows by means of carefully conducted tests the very great improvement in rust resistance which is secured by the use of heavier coating of nickel, recommending for general use a coating about .001 in. Such a coating gave rust-resistance ratings in his tests from 10 to 50 times as great as that of the .0001 in. coatings.

He points out that such heavier coatings can today be produced at only slightly greater costs by the use of larger operating current densities in conjunction with careful and scientific control of the plating bath and plating conditions. These conclusions are based upon both laboratory and shop tests, and are embodied in the practice of the C. G. Spring Company, with which he has been connected in this development work.

Professor Baker believes that every plating shop can and should in the same manner improve the quality and endurability of its own product, by giving careful attention to operating factors.

*Abstracted from an article on The Rust Resistance of Nickel Plated Steel by E. M. Baker, Assistant Professor of Chemical Engineering, University of Michigan, published in Inco, Vol. 5, No. 3. Originally published in the Journal of the Society of Automotive Engineers, February, 1924.

Cobalt and Its Uses

A comprehensive paper on cobalt, its production and some of its uses was given at Birmingham, England, before a joint meeting of the Institute of Metals and the Society of Chemical Industry on Tuesday, January 6th, by T. H. Gant, of Henry Wiggin & Company, Ltd., Birmingham. The speaker said that cobalt always occurred with other elements, mainly silver, nickel, copper, sulphur and arsenic. The chief sources of supply are countries of the British Empire, mainly Canada and Australia. The Canadian deposits of silver cobalt ores occurred in Ontario. The cobalt ores usually contained about 7 per cent to 8 per cent of pure metal and the Australian ore over 25 per cent. The Birmingham manufacture was commenced by Charles Askin, who founded the works now owned by Henry Wiggin & Company, Ltd., in 1834, chiefly to supply nickel, for which there was a great demand. Great difficulties were met with in separating the nickel from the cobalt, but it was eventually done with sodium hypochlorate. The principal and probably the oldest use of cobalt oxides and compounds was in the ceramic industry, where they are still used as a body or glaze stain and as an under-glaze or on-glaze stain. Most of the high class china depends for its coloring on the beautiful blue of cobalt. The various colors are made by mixing cobalt oxide with the oxides of iron, chromium, manganese, copper and nickel. Cobalt was also used for paints and driers, enamels, and latterly in the manufacture of cobalt steels and as an alloy with chromium. The speaker expressed the belief that if cobalt could only be cheapened so as to compete with other alloys it would sweep tungsten steels off the market.—J. H.

Foundrymen's 1925 Convention in Syracuse

At the annual business meeting in Milwaukee, all invitations for the 1925 convention of the American Foundrymen's Association were referred to the Board of Directors for consideration. At the annual Board meeting in November, the Directors voted unanimously in favor of some eastern city and authorized the President to appoint a sub-committee of five of the Convention and Exhibits Committee with full power to name the city and date of the 1925 convention and exhibit. The following were named as members of this committee: President L. W. Olson, Vice-President A. B. Root, G. H. Clamer, N. T. Johnston and V. E. Minich.

Before a decision was reached, Syracuse came in with an invitation and urgent request that their city be considered. The Secretary went there to investigate. On March 3rd a committee meeting was held there, at which time it was decided to hold the next convention and exhibit in Syracuse October 5 to 9 inclusive, 1925.

Further details will be published in a later issue.

The Use of Abrasives

A Practical Article on the Relative Merits of Emery and Artificial Abrasives. Also Methods of Mixing and Using Glue.

Written for The Metal Industry, by S. A. COCHELL, Foreman, Polishing Department, Michigan Stove Company, Detroit, Mich.

Before the World War almost all polishing was done with emery, but now, artificial abrasive have come into use, such as carborundum, alundum, aloxite, lionite, etc. The time when an ordinary solid emery wheel answered the purpose of grinding off the gates and trimming castings is past, and it has been superseded by artificial abrasive wheels, that cut more quickly and last longer. The same thing applies to the artificial grain for finishing and polishing. Unlike emery, which can be held to the wheel with hide stock glue, these extremely hard and artificial grains do not break into irregular cutting points like emergy grain, but from the wheel, leaving it altogether.

In many large manufacturing plants, the use of emery has been almost entirely eliminated. Some use only artificial abrasive, while others mix emery with the artificial and use it in the proportion of one to three, respectively. In other words, they mix it to conform with their particular line of work.

The important thing is to get an adhesive that will hold these hard artificial grains on a polishing wheel. Some use a good grade of hide stock emery glue, that sells for about 22c. or 24c. per pound, and if submitted to the chemistry department must stand high in viscosity. This same glue taken from the glue pot at 140° to 145° F., applied to the polishing wheel by the operator will invariably chill to whatever the temperature of the wheel room may be, before it is rolled in the abrasives. Then you will find that a thin skin has formed on the surface of the glue and instead of the abrasive cutting through this skin and finding a setting on the face of the wheel, it simply sticks to the surface of the glue and after the wheel has been worked on a short while it will smear instead of cutting and you will find that the abrasives have either fallen to the floor or have gone down the blower pipe. This alone might not be noticed so much when emery could be purchased for 3½c. to 4c. per pound, but artificial abrasives at 14c. or 16c. are different.

This loss is mostly due to the rapid setting and chilling of the glue. The higher the viscosity, the quicker this thin skin forms on the glue. Something had to be added to the glue to overcome, to a certain extent, the viscosity, and at the same time not impair the strength of the glue which is necessary in order to obtain the maximum results.

At the plant where I am employed 90 per cent of all the abrasives used are artificial. The finer grains, such as No. 180 to No. 120, are used straight; No. 60 to No. 80, which are used for roughness, are mixed, 1 part emery to 3 parts artificial. These grains have to be kept warm.

The following are the exact methods of mixing the adhesive which we are using at the present time with good results: one pound C gum; 5 pounds granulated glue. Pour half the glue in a mixing can, add the pound of C gum, then the balance of the glue. Put cover on can and shake well. The object of this is thoroughly to mix the C gum and glue together in a dry form. Put 10 pounds of cold water in glue pot. Pour dry mixture in small stream while stirring with a flat paddle until all lumps are dissolved. Let it stand to soak fully one-half hour.

Cover pot. Put in glue kettle and stir occasionally until melted to a smooth liquid. If too thick, thin down with clean warm water. If the glue you are using is a good emery glue, this will be just the proper consistency for a heavy production.

Do not, if possible, let the water in your glue kettle get any hotter than 150°—160° F. (Don't boil—that is the business of the glue manufacturer and he has attended to it.)

When a pot of glue is left overnight, don't cover it. Let the air get to it. You will find that it will hermetically seal itself. If covered, one-half the strength is lost.

Don't dry wheel in an oven. Keep away as far as possible from artificial heat. The ordinary wheel room temperature, about between 70 or 80 degrees Fahrenheit is about right.

I will say further, that it is well known to men who have the handling of production in a manufacturing plant, that any change in the system or material used in production is invariably looked upon with suspicion by the men that do the work, and in order to make a change a great amount of tact has to be used to accomplish desired results.

I will cite one instances. The shop I have reference to was a large user of abrasives, mostly emery. With the artificial grains they did not have such success in holding them with straight glue. The glue that was working satisfactorily for emery would not hold the artificial abrasives. They tried and are using at the present time the above-mentioned mixture with very satisfactory results. This firm was using at the time 4-21 pound pots of liquified glue a day. They decided to make an effort to use artificial abrasives by using this glue and gum mixture. The men that were obliged to use it made all kinds of objections. They claimed that it made roughing out harder, that it was not as good as a straight glue mix and numerous other things. Shortly afterward one 21 pound pot of glue was dropped, making 3-21 pound pots used in a day, while the production was going up. Today this firm is using only 2-21 pound pots of liquid glue and their production has doubled.

In the past when a man wanted to cheapen the cost of his production the first thing that was done was to cut labor, forgetting entirely that the most efficient and highly productive plants in the world have also the highest paid help and the most contented.

The man who can make two blades of grass grow where one grew before is not alone doing something for himself, but for humanity also.

The same thing applies to the man who can produce two pieces of work with the same amount of power and material as was used to produce one.

Iron Cement

For filling up a hole in iron the following is used: 100 parts iron filings, free from rust; ¾ part fine sal-ammoniac; ½ part flowers of sulphur. Mix with salt water to a thick paste. See Metallic Alloys by Brannt for some good mixtures.—W. L. Abate.

Control of Nickel Solutions

How to Test a Nickel Solution for Acidity and Keep It at the Proper Point

Written for The Metal Industry by HARRY BUDDINGTON MAXWELL, Electro-Chemist, Rome, N. Y.

Control of acidity is one of the important points to be looked after in a nickel solution, for upon this depends, to a large extent, the quality of the plate deposited on the work.

The old way was to use litmus for testing and this will be referred to later in this article. For close control, the later and better method is to test the acidity with solutions of some of the dyes that react to acids and alkalies. A little explanation at this time will simplify the work later on.

All acids are dissociated or decomposed a little when dissolved in water with the formation of "hydrogen ions." The strength of the acid is proportional to the amount the acid is dissociated. Boric acid is a weak acid, that is, it forms few hydrogen ions when in solutions, while sulphuric acid is a strong acid and forms many hydrogen ions when dissociated.

Note carefully the distinction between concentration of an acid and the concentration of the hydrogen ions. The first is a measure of the quantity of acid in solution, the second is a measure of the degree of acidity. We may have a large quantity of boric acid in solution, but a low concentration of hydrogen ions, while with sulphuric acid we may have a small quantity of acid and a high concentration of hydrogen ions.

The nomenclature used when referring to the measurement of the degree of acidity by means of the hydrogen ion concentration is pH with a sub-figure denoting the normality of the solution. Thus pH_4 denotes that the solution is one of ten thousandth normal and may be expressed in any of the following ways:

$$pH_4 = \frac{1}{10000} = 0.0001 = \frac{1}{10^4} = 1 \times 10^{-4}$$

Remember that the higher the pH number the lower the degree of acidity. For example, take pH_6. This equals 0.000001 and is only one hundredth as acid as pH_4.

Litmus paper, this turns red at about pH_6, and is all right as far as it goes, but it does not go far enough. If we use congo red paper (which colors the reverse of litmus—that is red for alkaline and blue for acid and turns red at about pH_4) we may confine the degree of acidity between pH_4 and pH_6. But as pH_6 is only one hundredth as acid as pH_4 the range is too wide for close control. However, it is much better than no test at all.

In testing by the pH method with indicators the "drop ratio" method is employed. Take two test tubes of the same size, add an equal amount of the indicator to each. If an excess of acid is added to one tube the indicator will acquire the acid color of this indicator, and if an excess of alkali be added to the other tube the indicator will acquire the alkaline color of this indicator. If we now place the alkaline tube in front of the acid tube and look at them in line the color changes to the color we would have if half the amount of the indicator was con-

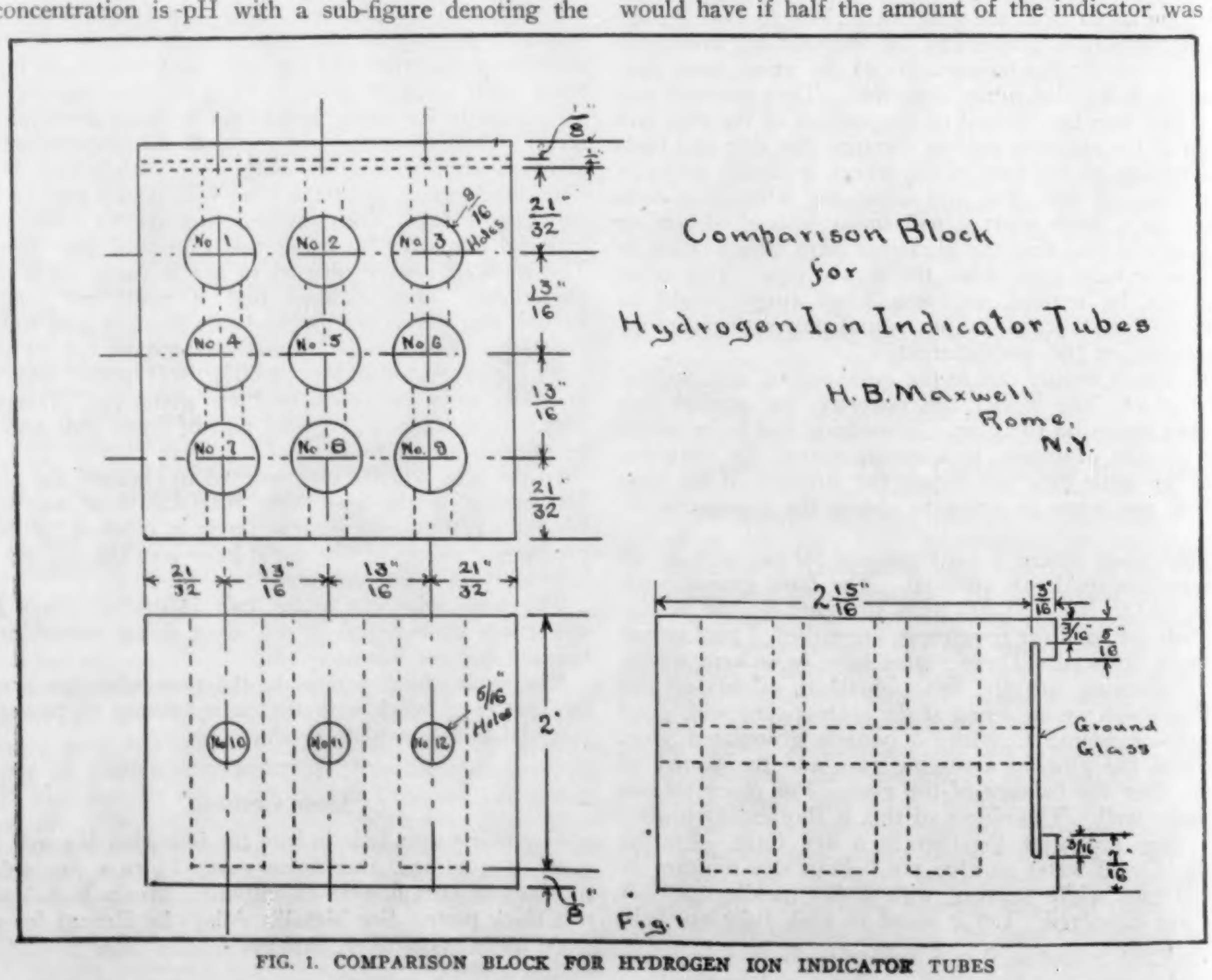


FIG. 1. COMPARISON BLOCK FOR HYDROGEN ION INDICATOR TUBES

verted to its acid color and half to the alkaline color. The pH of the different ratios of acid and alkaline indicators have been determined and are shown on a chart published by the Eastman Kodak Company, Rochester, N. Y., from whom it may be obtained.

The following apparatus will be necessary:

27 tubes flat bottom 4 in. long ½ in. inside diameter. These must be of uniform bore, and must be marked so as to hold five c.c. when filled to the mark.

1 comparison block as per Fig. 1.

1 tube rack as per Fig. 2.

2 50 c.c. burettes glass stop cocks, straight tips.

1 double burette stand.

1 each, 2 c.c., 5 c.c., 25 c.c. and 50 c.c. pipettes.

4 250 c.c. Erlenmeyer flasks.

1 250 c.c. volumetric flask.

3 50 c.c. wide mouth bottles with sulphur free rubber corks.

4 straight and rubber bulb pipettes (medicine droppers).

Bore rubber corks for the 50 c.c. W. M. bottles to fit the rubber bulb pipettes.

6 6.5 cm. long stem glass funnels.

1 box 5.5 cm. filter paper. 1 filter stand.

The easy way to make this block is to bore the 9/16 in. holes clear through and after blacking the inside of holes with a flat black paint, screw on a ⅛ in. thick piece for the bottom. There are two other loose pieces shown, which are to hold the ground glass for diffusing the light when examining the tubes through the sight holes at right angles to the holes in which the tubes are placed for comparison. If a piece of ground glass is not at hand it cane be readily made by cutting a piece to the right size and grinding it yourself. To grind, take a piece a little larger than the piece to be ground, put on some No. 220 emery, lubricate with water, put on the other piece and grind by hand with a rotary motion using light pressure.

The rack for the tubes has three rows of holes with eleven in each row. The bottom board can be made same as the comparison block by drilling all the way through and screwing on a bottom piece. Use the first row for the alkaline tubes, the middle row for the acid tubes, the back row for extra tubes, of which it is well to have a few. The extra dropper can be kept here, too. It is convenient to have labels on the tubes giving the pH and number of drops of indicator to each tube. Small gummed labels are convenient, and if given a coat of paraffin will last a long time.

Brom-cresol-purple is the indicator preferred by the writer. It gives a range of $pH_{5.3}$ to $pH_{7.2}$. In preparing this indicator, and for use with same, it will be necessary to have a twentieth normal solution of NaOH; also same of HCl. Take 0.1 gram of the indicator, place in an agate or glass mortar, add 3.3 c.c. of 0.05N NaOH and grind until dissolved. Then put into a 250 c.c. graduated flask and dilute to the mark with distilled water. Be sure that all utensils used are clean, well rinsed with distilled water and dried before use.

CONSTANTS FOR BROM-CRESOL-PURPLE.

Alkaline Tube	Acid Tube	Ph for each pair of tubes
1 drop	9 drops	5.3
1.5 drops	8.5 "	5.5
2 "	8 "	5.7
3 "	7 "	5.9
4 "	6 "	6.1
5 "	5 "	6.3
6 "	4 "	6.5
7 "	3 "	6.7
8 "	2 "	6.9
8.5 "	1.5 "	7.0
9 "	1 "	7.2

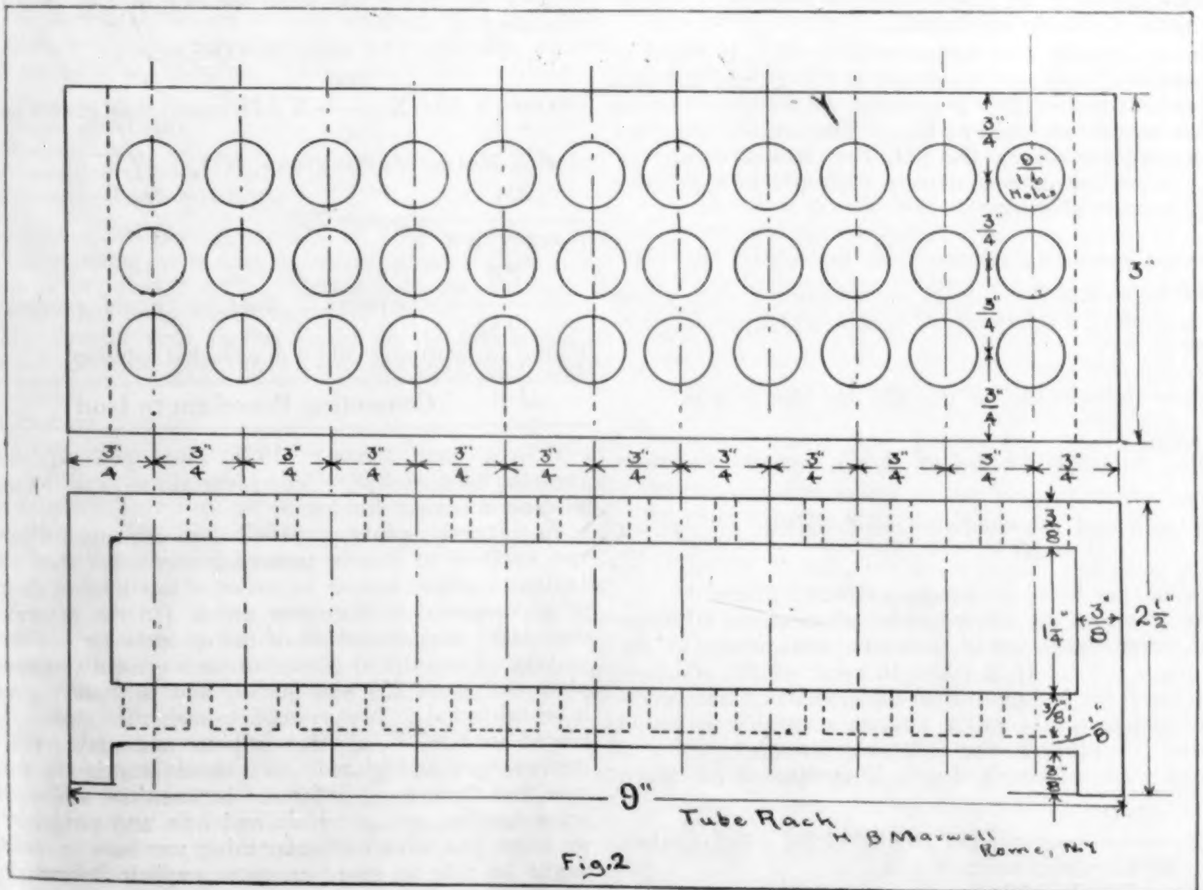


FIG 2. TUBE RACK

Put about two c.c. of distilled water in each tube, then add the number of drops of indicator to each tube as per above table. Fill to the 5 c.c. mark with distilled water, place in the rack, alkaline tubes in the front row, acid tubes in the second row. To each of the alkaline tubes add one drop of 0.05N NaOH solution and to each of the acid tubes add one drop of 0.05N HCl solution.

For the tubes with the half drops it is easier to add the whole number of drops of the standard indicator, then take equal parts of indicator and distilled water to fill the dropper and add one drop of this to each tube where one-half drop is needed. Insert rubber stoppers and shake well. Fill one of the 50 c.c. wide mouth bottles with dropper inserted through the rubber stopper with the indicator solution, one with the 0.05N NaOH solution and the other with the 0.05N HCl solution.

To test a nickel solution take about 50 c.c., filter it and to each of three comparison tubes add 5 c.c. of this solution. Place the tubes in holes 7, 8 and 9 in the comparison block. To the one in 8 add 10 drops of the indicator and to 7 and 9 add 10 drops of water (distilled). Shake well.

Fill tubes 2 and 5 to the mark with distilled water, then take pH_4 alkaline tube in 4, acid tube in 1, alkaline tube $pH_{7\cdot 2}$ in 6, and acid tube in 3. The color should be between these two outside colors when viewed through the sight holes 10, 11 and 12. By changing pairs of tubes the color may be matched, or we find it lies between the colors of the two indicators used, as, for example, we have $pH_{5\cdot 7}$ in 1 and 4, and $pH_{5\cdot 9}$ in 3 and 6. In this case we would call the degree of acidity $pH_{5\cdot 8}$.

There is a close relation of the pH of the solution and the quality of the nickel deposited. At pH_4 and below, the deposit is bright, but the metal deposited is brittle and the work is sure to be pitted. This brittleness of the deposit again shows up above $pH_{6\cdot 8}$.

For best results on average work a $pH_{5\cdot 9}$ is found to work well. This is for a solution at 70° F. and in a still solution. If the solution is agitated the solutions may be worked successfully up to $pH_{6\cdot 9}$. The cathode efficiency is increased by raising the pH, the current density or both. With low current density high pH is imperative to get cathode efficiency.

NEUTRALIZING THE SOLUTION OR ADJUSTING THE pH

With brom-cresol-purple as an indicator a deep green color is neutral, a yellowish color, acid, and a purple color, alkaline.

Should the solution be too alkaline titrate with $\frac{N}{20}$ H_2SO_4. A normal solution of H_2SO_4 contains 49 grams of the acid and $\frac{N}{20}$ contains one-twentieth of this, or 2.45 grams per liter; 1 c.c. equals 0.00245 grams.

Take 50 c.c. of the filtered nickel solution add 10 drops of the brom-cresol-purple indicator and titrate to the deep green color. If it takes 10.5 c.c. of the standard acid to reach the end point then the amount of acid necessary to add to a 300 gallon tank to neutralize it would be found according to the following formula:

Value of 1 c.c. of standard acid X number of c.c. taken

$$\times \frac{1000}{\text{50 c.c. nickel solution taken}} = \text{grams per liter of nickel solution taken}$$

Grams per liter X 3.78=grams per gallon.

$$\frac{\text{Grams per gallon}}{\%H_2SO_4 \times \text{Sp. gravity}} = \text{Number of c.c. of acid per gallon.}$$

$$\frac{\text{Number of c.c. per gal.} \times 300}{\text{29.57 (c.c. per fluid oz.)}} = \text{fluid oz. to neutralize 300 gal.}$$

Working this out,

$$0.00245 \times 10.5 \times \frac{1000}{50} \times 3.78 = 1.94 \text{ grams per gal.}$$

$$\frac{1.94}{.95 \times 1.84} = 1.11 \text{ c.c. per gal.}$$

$$\frac{1.11 \times 300}{29.57} = 11.65 \text{ fluid oz. to neutralize 300 gal.}$$

Should the solution be acid, titrate with $\frac{N}{20}$ NaOH solution. One c.c. of this solution equals 0.002 grams NaOH, and if it takes 10.6 c.c., to neutralize 50 c.c. of nickel solution we proceed as before to the point where we got grams per liter.

$$0.002 \times 10.6 \text{ c.c.} \times \frac{1000}{50} = 0.424 \text{ grams per liter.}$$

0.424 X 0.134=0.0568 oz. per gallon.

0.0568 X 300=17 oz. of stick NaOH for a 300 gallon solution.

It is better to neutralize a nickel solution with ammonia water than with sodium hydroxide. In doing this we titrate with NaOH solution as before.

As one c.c. of 0.05N NH_3 equals 1 c.c. of 0.05N NaOH we figure the same number of c.c. of NH_3 as was used of NaOH.

1 c.c. of 0.05N NH_3 equals 0.00085 grams

$$0.00085 \times 10.6 \times \frac{1000}{50} \times 3.78 \text{ equals 0.68 grams per gal.}$$

0.68 X 300 equals 204 grams, NH_3

$$\frac{204}{0.285 \times 0.9} = \text{equals 797.}$$

$$\frac{797}{29.57} = \text{equals 27 fluid oz. liquid ammonia required to neutralize 300 gallon nickel solution.}$$

Cementing Porcelain to Iron

Q.—In your January, 1925, issue you published a formula for a cement to hold porcelain to brass. Can you give me a cement for iron?

A.—Strictly speaking there are no cements for holding two surfaces of iron or metal together other than solder. If there is crack, hole or interstice of any kind in the metal to be cemented to the other article (in the present case porcelain) then almost all of the cements for use on iron will do. The sulphur-plaster of paris cement (sulphur 75, plaster of paris 25) sets quickly and permanently unless it be subjected to heat enough to melt the sulphur. Iron heated to 500° F. absorbs sulphur and makes the iron surface hard and glazed. We should say in the present case that there is no difference between the action on the brass handles and porcelain and iron and porcelain. If we knew just what particular thing you have in mind, we might be able to give you more explicit information.—W. L. Abate.

Meeting of the New York Platers

The New York Branch of the American Electro-Platers' Society met for its 16th annual banquet on February 21, 1925, at the Aldine Club, New York. C. H. Proctor, Founder of the Society and Plating-Chemical Editor of THE METAL INDUSTRY, took charge of the educational session.

Mr. Proctor read a paper on the control of brass solutions. He explained the method by which the free cyanide could be kept up to continue the proper anode reduction. In answer to a question, he mentioned that at one time the "McKinley Gold Finish" had been popular, which was a brass plate made to look like gold. This had been effected by adding a little nickel to the solution as a cyanide.

Mr. Tompkins, of the Crescent Washing Machine Company, gave a lecture, illustrated by lantern slides on the application of cleaning solutions and methods of cleaning. He showed how metal parts were now being cleaned in large quantities mechanically, and how the old hand methods had been eliminated. The slides illustrated a number of actual installations of small, medium sized and large machines. (In an article in THE METAL INDUSTRY for October, 1924, page 402-404, the methods followed in cleaning are described and illustrated.)

A paper by Mr. Burke on Bright Brass Solutions was read for him as he was unable to be present at the meeting. Mr. Proctor described the deposition of bright nickel on die castings and passed around a number of samples of the work which had been done by this method. These samples were extraordinary in the quality of the work done, and the beauty of the finish. They were perfectly bright without having been buffed or polished in any way.

The methods used were substantially as follows: the pieces were first cleaned in soap solution, then in a mild, alkaline, electro-cleaner, dipped in a cyanide dip, washed and placed in the solution. This solution is as follows:

Water	1 gallon
Single nickel salts	12 ozs.
Boracic acid	2 ozs.
Ammonium chloride	1 oz.
Crystallized sodium sulphate	12 ozs.

Bright nickel plating can also be done with the aid of cadmium, using some stick cadmium as anodes, but judgment is required for the regulation of the solution as cadmium has to be used sparingly.

Mr. Proctor read another paper on the production of the antique white gold finish. The old platinum oxidized

Alcohol	1 pint
Platinum chloride	1 oz.
Water	1 quart

The solution was heated to 212°-300° F., and painted on the article. This resulted in a black finish on the white gold base. The high lights were then relieved to suit and the article allowed to dry.

Mr. Miller read a paper on the plating of antimonial lead. An electric strike was used to remove the film caused by cleaning in a mild alkaline cleaner. This strike consisted of sodium cyanide, 1½ to 2 ozs. per gallon of water, with steel anodes, 140°-160° F., 5 volts, direct current. The articles were then rinsed, flashed in a brass solution and then nickel plated.

An antique silver solution was given as 3 ozs. silver per gallon of water, and 5 ozs free cyanide. For large pieces, 1½ oz. of silver and 9 ozs. free cyanide were used. These pieces were first struck in the solution at 4 to 6 volts, and then the voltage reduced to 1½ for plating. For a copper finish, the following solution was given:

Copper sulphate	1 lb.
Sulphuric acid	2½ ozs.
Molasses	½ oz.
Water	1 gallon

Mr. Miller also described the method of analysis of nickel salts.

A number of the visiting officials of the various branches were called upon to speak. Mr. Gehling of the Philadelphia Branch traced the history and development of the Society, and gave it as his opinion that the Society was getting better every year. Needless to say, this also applied to the Philadelphia Branch. **Mr. Mesle,** Editor of the Review, told the members that he had been advised of the improvement of the material in the last few issues, and gave the credit for this improvement to the members of the Society as a whole, and the individuals in particular who wrote the articles. **Mr. Smith** of the Newark Branch announced the open meeting to be held on April 25, 1925, and invited everyone to attend.

Mr. Hogaboom gave a talk on the difficulties which occurred with cyanide solutions particularly that of the building up of carbonates, which results in a dull deposit. He showed how cooling or "freezing" the solution precipitated these carbonates out and removed their influence. It was sometimes advisable to boil this and then cool it off to effect its precipitation. If, however, the solution was then too concentrated, water could be added and the operation repeated as many times as necessary to eliminate the excess carbonates.

Mr. Feeley of the Montreal Branch corroborated Mr. Hogaboom's remarks with his experience in plating during the winter in Montreal. He went on to tell the members how Montreal was preparing to receive the annual national meeting of the society, providing facilities for the supply manufacturers, making it easy for them to bring their supplies, samples and equipment in and out of Canada; and providing hotel accommodations. There would be no trouble with the customs. Mr. Feeley said that Montreal wanted 500 delegates and would get them. Twelve good papers had already been arranged for.

Mr. Uhl, Past Supreme President of the Society greeted the members, telling them how glad he was to be present, and Mr. Graham of the University of Pennsylvania, instructor of the Philadelphia Branch, explained how the scientific laboratory man could help and was helping the plater to become more scientific in his own work.

After the afternoon session, the banquet was held with the usual gaiety and jollification. As souvenirs, 144 baskets of mints were given to the ladies. A number of prizes were distributed at the banquet to the ladies, and the prize-winners were the following:

Mrs. S. L. Dickinson, Elmhurst, L. I.
Mrs. H. Wohl, 246 Covert Street, Brooklyn, N. Y.
Mrs. S. O. Johnson, Hollis, L. I.
Mrs. Havens, Richmond Hill, L. I.
Miss Elizabeth Panno, 21 Prince Street, New York.
Mrs. Philip Sievering, Brooklyn, N. Y.
Mrs. McGinnis, New Brunswick, N. J.
Miss Peggy Adams, 14 Steinway Avenue, Astoria, L. I.
Mrs. Liguori, Brooklyn, N. Y.
Miss Broidy, Jersey City, N. J.
Miss Carney, Jersey City, N. J.
Mrs. Cermak, Jackson Heights, L. I. City.

A total of 417 members and guests attended. It was a great meeting, like all the others of the New York Branch.

How Is the Buyer to Know?

How to Judge the Value, Efficiency and Economy of Metal Cleaners

Written for The Metal Industry by T. S. BLAIR, Service Department, J. B. Ford Company

The city of Detroit may not be representative of conditions but the fact remains that on a recent rainy afternoon the writer met four salesmen selling metal cleaning materials while visiting six shops in the Motor City.

Each of these salesmen seemingly presented a good case for his product. Two of these salesmen were apparently in touch with the requirements of metal working plants and plating shops while the others seemed out of their element. Each salesman represented a different firm and each offered a cleaner at a different price.

There is little doubt that one of these products is somewhat more efficient than the others, and more economical for the purchaser. How is the purchaser to know when he is actually getting his money's worth unless he has actually tested the specific cleaner offered him? Is the purchase of cleaners a gamble, or are there definite standards upon which to base judgment? It is the intent of this article to show that there are certain rules upon which to judge the efficiency and economy of any cleaner.

In no way reflecting on the knowledge of the members of the metal industry, the multiplicity of metal cleaners and so-called cleaners today available makes it impossible for the individual to be in touch with the merits and demerits of each. Even those of us who are especially interested in the subject of cleaners, each week find some new name or brand. It is true that the ultimate test of any cleaner is performance. However, buyers can not afford to make a trial of each of the many cleaners offered them, nor can they afford indiscriminately to grant trial orders, or test orders. How then is the buyer to judge cleaners other than by actual use?

The number of firms, taken the country over, listed as cleaning material manufacturers totals well over a hundred. The number of "fly-by-night" and reorganized firms number several hundred more—a number far too large to reflect genuine stability or efficiency for themselves or for their product.

The manufacturers of a metal cleaning material who have been in business a score of years or more surely have gained something from such experience that should be reflected in the effectiveness and economy of their products.

And not only is the age of the manufacturer of interest to the buyer. The type and kind of manufacturer also materially influences his product and its resulting use. Many so-called manufacturers are really jobbers, attaching their particular brand to the product of the often unknown manufacturer. The presence of a brand name does not guarantee that the so-called cleaner is other than a commercial chemical at a fancy price. Still other firms claim to produce cleaning materials when their main line of endeavor is far afield from that of cleaning, their entrance into the metal cleaning field being merely to gather as many profitable plums as are obtainable with the least possible care in manufacture and service.

There are very few makers of metal cleaners who own and control their processes through all the stages from the raw material to the finished product, but I believe that those firms who, in the true sense of the word, manufacture cleaning materials, can give a true dollar's worth for every dollar spent by members of the metal trades.

Among the considerations in buying cleaning materials the question of price per pound of cleaner is useful in but one way, and that is to ascertain whether or not the manufacturers' representative is inclined to "dicker." And if you do buy goods after "dickering" what assurance is there that the price finally agreed upon really is the lowest and best price? There are few cleaning material manufacturers whose salesmen flatly refuse to "dicker" and who consistently quote one price, but these few enjoy the good-will and trust of the trade in a way not permitted the average firm.

Aside from this the price per pound of a cleaner is of relatively little importance. The important issue is not price per pound but the cost per unit of cleaning successfully accomplished.

And yet another consideration enters the buying of metal cleaners. Most manufacturers of any size maintain a service force. Some of these representatives render true service and so gain your confidnce as to gain repeat orders, while others are merely trying to gain the greatest possible number of first orders. The firms that honestly endeavor to get your business and not just your first order have something in products which they are sure will economically serve your needs.

The buying of metal cleaners need not be a gamble. Neither need their use be indefinite, as service representatives of cleaning material manufacturers are closely in touch with the various possible operations and processes and their most economical performance. Owing to the difference in the bases of various oils which must be removed by metal cleaners, one single material may not suffice for every operation.

And even yet the tests by which the buyer may judge the worth of a metal cleaner aside from actual use are not exhausted. Can the firm you are dealing with, or are thinking of dealing with, guarantee sufficient supply for your needs at all times, and can rush orders be filled from local factory storages? It is both convenient and economical to be able to step to your 'phone and place an order locally for the specific cleaner you desire. Is the specific cleaner you are purchasing stable in composition, quality, results obtained, and in price? And is the price commensurate with the time required for cleaning, or will another cleaner at a lower or higher price do the same operation in less time with the use of less material? And if these doing the cleaning show lack of approval of certain materials is their view based on facts, or on the prejudice of custom?

Performance, it is true, is the proof of the manufacturers' promises. However, a metal cleaner is no better than the amount and extent of the experience of its manufacturer, his source of supply, business stability, financial standing, and degree of reliability.

The purchase of metal cleaners need not be a gamble even though the brand name and manufacturer be unknown to the buyer.

THE METAL INDUSTRY

With Which Are Incorporated
THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

Member of Audit Bureau of Circulations and The Associated Business Papers, Inc.

Published Monthly—Copyright 1925 by THE METAL INDUSTRY PUBLISHING COMPANY, Incorporated

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE, United States and Canada $1.00 Per Year. Other Countries $2.00 Per Year : : SINGLE COPIES, 10 CENTS
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Vol. 23 New York, March, 1925 No. 3

Contents

EDITORIAL

INSTITUTE OF METALS DIVISION

The 1925 meeting of the Institute of Metals Division, was especially noteworthy for several reasons. It was one of the best attended meetings ever held. The annual lecture was delivered by an internationally known authority, Dr. Carl Benedicks of Stockholm, Sweden. Papers were read which were of a consistently high character and even among these several stood out clearly.

Dr. Benedicks advanced an unusually interesting theory (interesting not only because it was new, but because of its simplicity), to account for the pitting and local corrosion in condenser and boiler tubing. According to his theory the pits are located accidentally wherever the bubbles of air, which have been included in the water, happen to attach themselves to the tubes. Underneath these bubbles it seems that corrosion goes on with unusual rapidity because of the fact that the tube is overheated due to the insulating action of the air bubble itself which does not carry off the heat from the metal wall. Under the influence of this overheating chemical activity is increased, and therefore pitting results.

The answer to this problem is de-aeration of the water passing through the tubing. This is was suggested, could be effected by the use of the same "hot-wall principle," that is, passing the water through a series of heated compartments, so arranged that the air could be driven off into successive domes as the water passes through the compartments.

The paper by Dr. Jeffries and Mr. Archer described the properties of two new types of high-strength aluminum alloys, both comparatively simple in composition. One consisted of about 4 per cent copper, with iron and silicon as impurities; the other, with 1 per cent magnesium and .6 per cent silicon. The advantage found was the possession of better working qualities than Duralumin, with consequent ease of manipulation and decreased cost of manufacture.

Messrs. Bassett and Davis described a ten-year sea water corrosion test of various types of tubes carried on together with a one-year salt spray test on similar tubes, to determine two things: 1—the corrosion resisting qualities of these tubes; 2—the correlation between the ten-year operating test and the one-year salt-spray laboratory test. The results found were interesting in that they pointed out the value of the present Admiralty tubing (copper 70, zinc 29, tin 1), and also the remarkably fine record of the 80 copper, 20 zinc mixture. But perhaps the most important information gained was that the short-time salt-spray test gave almost exactly the same results as the ten-year test. This is of utmost value as it will help to develop and improve accelerated corrosion tests, one of the most important features in the field of testing metals.

The paper by Messrs. Anderson and North on X-Ray Evidence vs. the Amorphous Metal Hypothesis was warmly discussed. The paper gave evidence of careful work, painstakingly carried out. Practically all the discussions centered about conclusion No. 7, which stated, "The fact that polished surfaces of metals given crystallographic diffraction patterns, shows that there is not a vitreous amorphous film in the surface, but simply a great multiplicity of crystal fragments."

The long and the short of the discussion seemed to be that this point was not proved. However, it seemed to be more or less agreed that it was difficult, if not impossible, to prove such a point, due to the very properties attributed to the vitreous amorphous film. Perhaps Dr. Benedicks voiced the consensus of opinion when he stated that the amorphous theory was only a theory, and as soon as the need for it became unnecessary, the theory itself disappeared. Nevertheless, a number of written and spoken discussions held that the theory was not yet disproved. It is noteworthy moreover that Dr. Rosenhain, one of its earliest and most prominent advocates, in an article in The Metallurgist for January 30, 1925, entitled "The Present Position of the Amorphous Theory," states, "The position of the theory has been strengthened rather than weakened by the further insight into the structure of metals which we have gained."

Another interesting paper was that by Merica and Waltenberg on the Malleability of Nickel, pointing out that of all the impurities known to be present in furnace refined nickel, only sulphur rendered pure electrolytic nickel non-malleable. In other words, contrary to the general belief, it was not oxygen or other impurities, but sulphur, which has caused the trouble.

As stated above, the meetings were unusually well attended and the discussions warm. The 1925 meeting will stand out as one of the important gatherings of the Institute of Metals Division.

BUYING CLEANERS

Like many other industrial fields, the business of manufacturing metal cleaners has grown enormously in the past twenty years, and has in addition become highly competitive. The average user of metal cleaners, unless he is equipped with a chemical laboratory, testing staff, etc., must be in a quandary about how to pick and choose from the large number of cleaners which are offered.

On page 112 of this issue, Mr. Blair discusses this important topic and gives his point of view. Naturally, this is the point of view of a large and long established manufacturer, and may meet with considerable objection from those who have not had the good fortune to be in business for such a long time. Regardless of the rights and wrongs of this question, however (and it is obvious, of course, that all sides of this question have their rights), the fact is clear that the problem needs to be thrashed out for the sake of the metal manufacturer who must purchase cleaners, and to whom those cleaners are of extreme importance, because his plating and finishing operations depend, for their soundness, upon the efficacy of his cleaners. All sides of this question should be discussed freely. How is the buyer to know what cleaner to buy? What are the reasons or talking points advanced by cleaner manufacturers? What part does price play? How is the quality determined and guaranteed?

We invite cleaner manufacturers and users to give us their points of view. We believe that the whole industry will benefit from an open discussion of this kind.

WASTE METALS

A few months ago there appeared a striking picture in the Scientific American with the caption "Costly Dump Heap." It showed an automobile junk yard in Chicago with hundreds of wheels, bodies, and castings, tanks and radiators lying in profusion. Figures from the Commerce Commission showed that out of the 4,000,000 automobiles built each year in the United States, cars to the value of $2,000,000,000 are junked each year.

On one hand this sounds like a terrific indictment of the motor industry for making such a highly perishable product, and on the other, of the general public for lack of care in using its property. Perhaps, there is a certain amount of justice in both these complaints.

The silver lining appears, however, in the fact that by far the largest part of this waste is reclaimed, at least, so far as metals are concerned. The report on Secondary Metals in 1923 (the last tabulated year), issued by the U. S. Geological Survey, shows that this industry is keeping up with others as regards growth and perhaps even with the motor industry as regards waste.

Secondary metals in 1923 were recovered to the extent of $205,418,600 as compared with $143,891,700 in 1922. Of this total, in round figures, copper accounted for $57,000,000; brass $73,000,000; lead $27,000,000; tin $25,000,000; aluminum $11,000,000; zinc $10,000,000; antimony $1,250,000, and nickel $1,000,000.

These statistics show, more plainly than words, the extent and value of the secondary metal industry. Waste is never to be condoned in any way of course, but it is somewhat reassuring to know that there is an industry of such proportions to take care of it, and reclaim whatever possible.

READING BUSINESS PUBLICATIONS

We received, recently, a terse and interesting letter from one of our old friends, Frederic B. Stevens, of Detroit, Mich., which included among other things, the following paragraph:

"My experience with trade papers brings to my mind the scriptural pearls before swine. I do not mean it literally, but I see so many trade papers in offices that are in piles, or they are on top of a desk or on a window seat or somewhere, which indicates, to my mind that they are not read except in a few instances. I mean that there are some doubtless that read the technical articles and perhaps they see the advertising pages, but as a rule there are so many printed things that come to one's office that I believe the trade journals escape the attention which they deserve."

Just how widespread is the neglect of business publications or trade papers is difficult to estimate. We all know that some people subscribe, but do not read; others read but do not subscribe, still others neither read nor subscribe. It is our firm belief however, backed up by the volume of letters which we receive from our own subscribers, that in the majority of cases, THE METAL INDUSTRY is read.

A certain amount of judgment is necessary in reading a trade or technical journal, just as in reading other literature. In the first place it is impossible for every article, every business item and every advertisement to interest every reader. The judicious reader looks over the titles, marks the articles which relate to his specialty either directly or indirectly, and then reads them carefully.

In large organizations a very simple system is employed by which journals are automatically read and kept track of by the proper people. A librarian looks over every issue and marks pages for the attention of different men in the organization. The copy is sent out with a reference-sheet attached and goes through the organization progressively, the sheet showing each man at once what will be of special interest to him.

Systems which apply in large companies cannot always be put to use bodily in smaller organizations, but the principles are, nevertheless, sound. The simple and very easy method of getting the greatest amount of benefit from trade and technical journals is briefly as follows:

1. As soon as the paper is received, tear off the wrapper.
2. Go over the titles carefully, marking those articles of either direct or indirect interest.
3. Read them as soon as possible and clip the material which looks particularly interesting, if you can do so without removing matter of interest to someone else in your organization. If not, get another copy of the same issue.
4. File the clipping in the proper place.
5. File the magazine in the proper place.

GOVERNMENT PUBLICATIONS

Statistical Abstract of the United States for 1923. Published by the Department of Commerce, Washington, D. C. Price 85 cents.

This annual volume covers statistics on the area and population of the United States; vital statistics; immigration and emigration; education; public lands and national parks; irrigation and drainage; farms and farm property; farm animals and animal products; farm crops and foodstuffs; forests and forest products; fisheries; electric light and power; mining and mineral products; manufactures; postal service; telephone, telegraph and cable systems; public roads and motor vehicles; steam and electric railways and express companies; internal waterways; merchant marine and ocean shipping; foreign commerce; commerce of noncontiguous territory; prices; wages; money and banking; business finance; national government finances; wealth; state, city, and local government finances; army, navy, civil service, pensions, veterans' bureau activities; elections, etc.; climate; statistical record of the progress of the United States; commercial and other statistics of the principal countries of the world.

Asbestos in 1923. By Edward Sampson. United States Geological Survey, Washington, D. C.

Abrasive Materials in 1923. By Frank J. Katz. United States Geological Survey, Washington, D. C.

NEW BOOKS

Copper and Its Alloys. By Charles H. Hughes, 2681 Amboy Road, New Dorp, S. I., N. Y. Price $1.00. A chart 17 x 22, arranged for ready reference.

This is a condensed chart and tabulation of the properties of copper and some of its alloys for handy reference. It is divided into three columns headed Copper, Alloys, and Tables. In the first column are paragraphs of copper ores, methods of extraction, grades, properties, etc. In the second column are some of the most important alloys and uses of copper. In the third are comparison of gages, weights of sheets, tubes, etc. The chart is a handy little compilation which contains some of the standard information.

Journal of the Institute of Metals. Volume 32. Edited by G. Shaw Scott, Secretary. Published by the British Institute of Metals, 36 Victoria street, London, S. W. 1, England. Size 5½ x 8½—832 pages.

This book includes the thirteen communications presented at the Autumn meeting of the Institute in 1924, the May lecture; the Autumn lecture, the 7th report of the Corrosion Research Committee, and an Abstract Section that is exceptionally full and informative. Most of the communications have been published in abstract in THE METAL INDUSTRY for October, 1924, and December, 1924.

CORRESPONDENCE and DISCUSSION

Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein

NICKEL PLATING PATENT—A REAL INVENTION?

To the Editor of The Metal Industry:

"Patent No. 1,504,206, August 12, 1924, Process of and Means for Nickel Plating—Edwin M. Baker, Ann Arbor, Michigan, assignor to Christian Girl, Kalamazoo, Michigan."

The above is a heading under Patents in The Metal Industry, October, 1924.

It's funny that no plater of our age should have thought of such a thing as the above and reaped the enormous harvest that is to be derived from the patenting of a process. Or is it that the incentive and application of thought successfully to develop a process of such could not be pumped into our brains with a high pressure lubricating system?

NO! We have used this method for years. The process was being used as far back as the old bicycle days, when it was called the triple plate, Nickel, Copper and Nickel. I believe that articles were written on this by Dr. Watts in 1916, and I have a recollection of reading some articles on same by Charles H. Proctor.

Directions are as follows: use substantially pure nickel anodes; a current density of a 100 amp.; heat to 85° F. A, nickel; B, Duplex copper; C, nickel.

I am for the inventor who has an original thought, but you will find that in most cases only a small part of the thought is original, and therefore a small part patentable. So, in getting a patent, invariably you have originated your thought from the summing up of others' ideas, some of which were not your own.

So why pick on the inventor for all the sympathy?

G. A. Barrow,
Member Cleveland Branch, American Electro-Platers' Society.
Jackson, Mich., February 16, 1925.

To the Editor of The Metal Industry:

The patent referred to in Mr. Barrow's letter, that is U. S. Patent No. 1,504,206, Process of and Means for Nickel Plating, has as its object the protection of a particular combination of steps in an electroplating process. It is well recognized that old elements enter into the new combination, as for instance, the plating in sequence of nickel, copper and nickel, or the use of Watts' nickel plating solution, which is mentioned in the patent specifications. It is believed that the combinations claimed in the patent are new and possess patentable novelty, in which case the manufacturer would be entitled to patent protection. Such patent protection was sought and the Patent Office, familiar with the old art mentioned above, and also other old arts, concurred in this opinion by granting a patent covering the novel combinations. Even a casual reading of the patent should show that the mere plating of nickel, copper and nickel in sequence is not claimed; nor the Watts' bath, as Mr. Barrow seems to believe is the case.

When old elements are used as part of a combination claimed in a patent, it is important that a new or superior result be obtained. The C. G. Spring & Bumper Company, manufacturers of automobile bumpers, owns this patent and uses the process covered therein. The unusually rust-resistant quality of plating on the bumpers manufactured by this company is good evidence of a superior result. The validity of this, or of any other patent, is not guaranteed by the Patent Office, but may be only established by the courts through the legal course provided for that purpose.

Edwin M. Baker, Consulting Chemical Engineer.
Ann Arbor, Mich., March 7, 1925.

TARNISHED BRASS PLATE

To the Editor of The Metal Industry:

With regard to your Problem 3,295 covering tarnished brass plate (page 456 November, 1924), the writer wishes to say that your writing upon same is very good. However, in my days I have plated a good many million pieces of hardware for trunks, satchels and automobiles, and found that the cold water, as well as hot water should be changed quite frequently. By adding to the hot water a small portion of either boracic acid or sulphuric acid, it will eliminate a lot of the tarnish. For instance, place 3 or 4 rods across your hot water tank, and after you have immersed your work in the cold water, hang your work in the hot water for some little time. This will have a tendency to take the impurities out of the pores of the hardware, and leave them nice and clean as well as bright. You will find that the water which you are using is without a doubt full of iron. This will stain the brass, nickel, silver, etc. To convince yourself, you might try distilled water that will not tarnish your work, but I will assure you it will tarnish your pocketbook. I have had this trouble in the winter as well as in the summer.

No hardware or any other articles should be wrapped until the lacquer is absolutely dry. The lacquer should be very thin—just so that it does not show the rainbow.

Andrew V. Re.
Coldwater, Mich., November 10, 1924.

To the Editor of The Metal Industry:

I have read with interest Mr. Andrew V. Re's comment of Problem 3,295, page 465, November, 1924, covering the tarnish of brass plated steel products. I am always pleased to receive such comments because it proves that intelligent platers read The Metal Industry, and are at all times interested in their fellow-workers' problems. It is the interest such as shown by Mr. Re that is paving the way for the plater of yesterday to become the plater of the future.

The methods outlined by Mr. Re were used by the inquirers before presenting their problem to the writer for solution. The rinsing waters, both cold and hot, in this particular instance were constantly changed. I concluded as Mr. Re has done, that iron may have been the factor in causing the trouble, but it is difficult to prove this by analysis of the water. The condition in question usually occurred the two first days in the week, which would indicate solution of iron in the cold water pipes leading to the plant from the water mains. Phosphoric acid in dilute form and metallic zinc placed in the hot water evolved hydrogen which prevented the formation of a possible oxide of iron stain.

These were the conclusions arrived at when the staining of the brass plated steel work was eliminated by the methods outlined.

Charles H. Proctor.
Arlington, N. J., December 15, 1924.

BENDING BRASS TUBES

To the Editor of The Metal Industry:

The method for bending brass tubes given by P. W. Blair on page 57 of the February, 1925, issue of The Metal Industry is very satisfactory for copper and many kinds of brass pipe and tubing. While it can be applied to the sandard brass pipe mixture, the method is not applicable to all kinds of brass, so a word of warning should be given.

Copper, brasses which contain 90% copper and over, and which are low in lead and iron, and brasses containing between 59% and 63% copper are malleable at red heat. Brasses containing from about 63% to about 90% copper are not malleable at red heat and must be bent cold. The latter, however, can be partially bent cold, then annealed by heating to dull red heat, cooled off and bent further. Ordinary brass pipe (which contains about 60% copper) and commercial bronze tubing (which contains about 90% copper) can be bent hot while the so-called two and one brass, 70-30 brass, low brass, rich low brass and Admiralty metal tubing and pipe must be bent cold.

Bridgeport, Conn.,
February 20, 1925.

Bridgeport Brass Company,
John L. Christie, Metallurgist.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ALUMINUM AND NICKEL BRONZES

Q.—Can you give me a good aluminum bronze mixture that will have the following results: tensile strength between 80,000-90,000, if possible; between 30,000-40,000 in elastic limit? These two items are mostly considered and are claimed can be met. Also a nickel bronze mixture and how to melt it successful?

A.—The mixture we would recommend on aluminum bronze to meet your requirements is, 85 coper, 10 aluminum, 4 iron, 1 30% manganese copper. Use tinned iron similar to the tinned iron for tin cans.

For the nickel bronze mixture if you will state the class of work you want this mixture for, we will be better able to advise. There are, however, the following mixtures used:

For Valve Work, 88½ Copper
9 Nickel
1 Tin
½ 30% manganese copper.

Another alloy used for high pressure steam fitting is composed of:

69 Copper
20 Nickel
10 Zinc
1 30% manganese copper.

An alloy of half nickel and copper is best used in making the alloy. Melt 49 pounds of copper and 40 pounds of the alloy; then stir in the zinc and before pulling the pot from the furnace add the one pound of 30% manganese copper.—W. J. R., Problem 3,330.

CASTING NICKEL ANODES

Q.—We were wondering if you could give us any information relative to casting nickel anodes in steel molds.

A.—We do not know of any method where cast nickel anodes of the standard shape can be cast in steel molds. Owing to the high melting point of the nickel it would set too quickly. We do not think it would be possible to pour any of the standard shape anodes in steel molds.

The mold generally used for casting nickel anodes is the dry sand molds. The molds are made in two parts, flask in the usual way and a facing of silica sand bonded with a good clay and molasses water to about the consistency of molding sand. A steel molding facing such as silica flour is painted on the mold before drying.

The mixture generally used consists of 92% nickel, 4% old files, 4% tin. Use as a flux, flourspar and lime. Melt the nickel, files and tin together. The tin cuts the nickel and helps the melting. It is necessary to use an oil or gas as fuel to obtain the best results.—W. J. R., Problem 3,331.

CLEANING BRASS CASTINGS

Q.—Will you please advise us the formula of a chemical solution for removing sand from brass castings, also a solution for dipping red and yellow brass castings, similar to the process which is used in chandelier work?

A.—For removing burnt-in sand from brass castings, prepare a solution as follows:

Water	1 gallon
Commercial hydrofluoric	1 pint
Muriatic acid	4 ozs.

Heat to 120° F. A plain wooden or lead lined tank must be used to hold the acid solution. On a small scale an alcohol barrel, cut down to two-thirds its original size, will answer. Coat the outside with an asphaltum paint to protect the iron hoops from action of the acids. After pickling in the above solution, wash the castings thoroughly in cold and hot waters. When the castings are cold, immerse them in the following bright acid dip, which must be kept cool by immersing the acid receptacle in cold running water:

Nitric acid (38°)	1 gallon
Sulphuric acid (66°)	1 gallon
Water	1 quart
Muriatic acid	2 ozs.

Use the dip **when cold.**

Give the castings one or two quick dips, then wash in cold and boiling waters, and dry out in sawdust.—C. H. P., Problem 3,332.

DEPLETED BRASS SOLUTION

Q.—We are having some trouble with our brass solution and we wish that you would see if you can solve it for us. We made up a new solution and at first it plated a very bright brass. After a while it changed so that now it is plating copper and bronze. We added some copper carbonate but it did not change it any. When the solution is stirred up it will plate brass on some parts of the work. We also note that it has changed the color of the anodes from brass to a copper color.

We are using a lead-lined tank and we wish that you would let us know if that will affect the solution.

A.—Lead lined tanks are not satisfactory for brass plating solutions as the sodium cyanide is converted eventually to caustic soda after the cyanogen has been used up. The oxide of lead that may be formed on the lining of the tank is held in suspension in the solution and will coat the anodes over with an insoluble coating, with the results that the greater part of the metal is deposited out of the brass solution without any replenishing from the anodes.

You may have to build up the solution with metal—better remove it first from the lead lined tank. To bring the solution back to a normal action, add about 2 ozs. bisulphite of soda per gallon, then follow up with 1 oz. sodium cyanide or more per gallon. The results will, no doubt, be a uniform deposit of copper or bronze.

Run the solution for a short time, afterwards adding aqua ammonia 26° to the solution to bring up a normal brass color.

The addition of 1 grain of white arsenic dissolved in twice its weight of caustic soda in as little warm water as possible will produce a bright brass—if added per gallon of solution.

See that the anodes are a normal brass color before plating operations are commenced. We believe these additions will produce a uniform brass deposit.—C. M. P., Problem 3,333.

DEPOSIT WHITE NICKEL

Q.—We are having trouble with our white nickel plating on steel turning yellow a few days after it has been plated. It comes out a good white.

We are sending herewith sample. Our solution is made up as follows:

12 oz. single nickel salt
2 oz. boric acid
2 oz. soda chloride

It plates fast and is good in every way but for the yellow color after standing a few days.

A.—We can observe nothing wrong with the nickel deposit submitted to us. It is a normal deposit. The yellow tone which can be removed by rubbing lightly upon a piece of soft cloth, would indicate that your methods of drying the product out after nickel plating are at fault.

Possibly the wash waters or the sawdust becomes too sour by constant use, which may produce the yellow tone.

Try the following: after washing quickly in cold water, immerse the product in a cold soap solution to which is added 1 to 2 ozs. of Proctor & Gamble's ivory soap chips per gallon

of water. Dissolve the soap chips first in a little boiling water, then add to the cold water. From the soap solution, drain well, then immerse in boiling water. Follow up with the regular sawdust drying out. Yellow nickel deposits, however, sometimes result when the solution is below normal in free acid.

If the changes in your drying out methods, as suggested, do not eliminate the yellow tone or tinge, then add free acid to the solution. Start with 1/16 oz. pure muriatic acid per gallon of solution, which may be increased to ⅛ oz. per gallon or more. The formula you use is satisfactory.—C. H. P., Problem 3,334.

HEAVY NICKEL DEPOSIT

Q.—How can we obtain a deposit like that upon the specimen of iron enclosed, viz: a nickel-deposit of 2 or even more millimeters thick, which adheres solidly. This coating cannot be torn apart at the joint, for there is absolute interlock between the surfaces. When this specimen was subjected to test, the metal, having the lower tensile strength, yielded and not the junction.

A.—In the United States at the present time, nickel is being deposited upon callender rolls manufactured from chilled gray iron to several times the thickness of 2 millimeters, which only approximates the American measurement of ¼ inch thick.

It is possible to deposit the nickel up to 8 millimeters under the current conditions which must approximate the following:

1. The surface of the metal upon which such thick deposits of nickel is to be deposited, must be chemically clean. The usual methods so applied to metal surfaces will produce such a surface.

2. The nickel solution must be prepared upon the following basis:

Water	1 litre
Nickel sulphate	240 grams
Nickel chloride	30 grams
Boric acid	22 grams

Acidity of solution not to exceed pH 5.4 or 6.0; temperature not to exceed 55° C.; solution to be continuously filtered during plating operations; voltage 2½ to 4; amperage 25 minimum per sq. ft. of surface area.

The hydrogen must be controlled constantly by additions of hydrogen peroxide to the nickel solution to produce malleable hydrogen—free nickel deposits.

The hydrogen peroxide should be 3% basis. Additions to the nickel solution to neutralize the hydrogen should be 1 c.c. per litre minimum and 4 c.c. maximum per 24 hours. If paper rolls made from chilled cast iron or similar rolls are to be nickel plated, then during the plating operations the rolls should revolve in solution 4 to 6 revolutions per minute. Only half of the roll should be under the nickel solution, the other half continuously in the atmosphere.

In America a method is used to eliminate any hydrogen gas that may adhere to the roll being nickel plated and otherwise act as a burnishing medium as follows: a piece of cast iron is prepared to equal the length of the roll to be nickel plated. This is so shaped that it conforms to the diameter of the roll. It should be polished to a smooth surface and then be so arranged above the solution so that it presses against the roll as the roll revolves in the solution. It has been found that the nickel deposited under the conditions as outlined is malleable and adherent and can be deposited to 8 millimeters without any defects.

Chemical analysis of the nickel solution is necessary at least once a day so that its deterioration can be checked up and the necessary additions made to the solution to keep it standardized to its original basic formula.—C. H. P., Problem, 3,335.

PLATING RADIATORS AND BUMPERS

Q.—Will you kindly give us information that you may have relative to zinc plating on steel before copper plating and nickeling. So far as I can see the cost is not great and if this adds to the rust resistance why is it not used more extensively on such parts as radiator shells and bumper bars?

A.—There is no advantage in depositing zinc upon steel previous to copper plating, and finally nickel plating to produce a more satisfactory rust proof finish. Copper and zinc set up an electrolytic action in the presence of moisture so would increase the rate of corrosion rather than retard it.

A light colored brass deposited upon the zinc plated surface and then nickel plated would be beneficial to a more or less extent.

But for the maximum results, the alternating deposits of copper, nickel, copper and nickel is the final answer.

1. Deposit copper in a hot cyanide solution for 3 to 5 minutes.

2. Wash thoroughly in water and plate in a warm nickel solution for the same time.

3. Plate in the hot copper cyanide solution to get sufficient copper to color buff to a lustre.

4. Cleanse and nickel plate in a warm nickel solution. The temperature of the solutions should be about 120° F. One copper and one nickel solution is all that is necessary for results.—C. H. P., Problem 3,336.

SILVERING BRASS DIALS

Q.—Please tell me about silvering dials with cream of tartar, salt and silver.

A.—The following formula is used for silvering brass dials. It may be used with or without the whiting.

Chloride of silver	1 oz.
Cream of tartar	2 ozs.
Common salt	2 ozs.
Floated gilders whiting	2 ozs.

Mix as may be required for use, with water to a paste, and apply with soft cloths or soft sponge to the brass dials.

The preparation of the dials is important to give the correct reflection. Dials are usually polished with buffs and then polished in a lathe revolving at 300 to 500 revolutions per minute. The factor in the final polishing is emery cloth. 100 to 180 fine depending how coarse or fine the lines are required.

Start polishing with the emery cloth from the extreme outer edge of the dial, then move in a direct line towards the center of the dial. After this operation, wipe off any brass dust from the dial, and silver the surface directly; wash afterwards in water, and preferably in denatured alcohol—dry out.

Lacquer the surface with a transparent white lacquer that can be purchased from any lacquer manufacturer advertising in The Metal Industry.

Many clock dials are now coated with an electro-tin deposit instead of silver and finished as outlined.

We can, if necessary, furnish you with the formula for the electro-tinning solution. There is no work published that we know of that treats exclusively on the silvering of dials.—C. H. P., Problem 3,337.

SALT SPRAY ON NICKEL

Q.—Could you please send us the following information in regard to a good salt test for nickel plated radiator shells. Also, let us know the length of time that these salt tests are put on them, and any other information you think would be of help to us.

We are figuring on polishing, copper plating and buffing, nickel plating and buffing steel radiator shells for an automobile firm, and one of the requirements is that we give them full information in regard to the test these nickel plated radiator sheels will stand and how it is done.

A.—The standard method of testing nickel deposits on steel against corrosion is the 20 per cent salt spray test solution.

Write to the superintendent of Documents, Government Printing Office, Washington, D. C., for circular of the Bureau of Standards, No. 80, price 20 cents, entitled "Protective Metallic Coatings for the Rust Proofing of Iron and Steel."

In the circular will be found a plan to enable anyone to build the salt spray apparatus. The most effective rust proof nickel deposits are now produced from alternating deposits of copper, nickel, copper and nickel, using heated solutions, Temp. 120 to 140° F. for the purpose.

A total thickness of one and a half thousandths of an inch of all deposits will give a 50 to 75 hours' resistance to rust under the salt spray test.—C. H. P., Problem 3,338.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,520,732. December 30, 1924. **Process of Coating Ferric Articles with a Metallic Protective.** George K. Thompson, Summitt, and Joseph Eckert, Jr., Maurer, N. J., assignors to Hoyt Metal Company, St. Louis, Mo.

The process of coating ferric articles which comprises applying a flux to said articles, immersing them in a bath containing molten lead as a major ingredient, then cooling said articles, again applying a flux to the surface of said articles and immersing them in a bath containing molten lead as a major ingredient, withdrawing said articles from the last mentioned bath, and then immersing said articles in a bath of molten waxy material.

1,520,794. December 30, 1924. **Refractory Alloy for Wires and Rods.** Frederick W. Zons, New York, N. Y.

An alloy consisting principally of tungsten and tantalum, the former being present in amount about two to about twenty times the quantity of the latter.

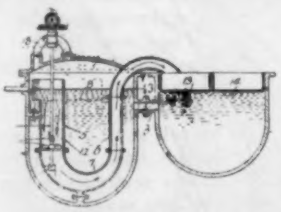
1,521,592. January 6, 1925. **Electro-plating Apparatus.** William E. Belke, Chicago, Ill.

In an electro-plating apparatus, the combination of a metal member to be immersed in the solution or electrolyte, a vitreous coating on said metal member, forming an insulation and protective covering therefor.

1,522,422. January 6, 1925. **Electro-plating Apparatus.** John T. Daniels, Newark, N. J.

In an electro-plating apparatus a rotating drum open at one end, an insulating disc adapted to close the other end, an insulating ring bearing against said disc on the inside thereof, a perforated plate supported on said ring some distance from the plate, whereby a chamber is formed between the disc and the plate and a disc-like electrode supported within each said chamber.

1,522,765. January 13, 1925. **Apparatus for Melting Scrap Metal.** Erwin L. Wilke, Hammond, Ind., assgnor to Metals Refining Company, Hammond, Ind.



An apparatus of the character described, comprising a pot to contain molten metal, a conduit in said pot and having inlet and discharge openings, the former being in said pot below the level of the molten metal therein, and the latter being outside of said pot, means causing the molten metal to flow through said conduit from said pot, and means at the inlet end of said conduit for introducing scrap metal into the same.

1,523,026. January 13, 1925. **Gold Alloy.** Otto Liebknecht, Frankfurt, Germany, asasignor to The Roessler & Hasslacher Chemical Company, New York, N. Y.

An alloy comprising gold, nickel, zinc, copper and palladium, in about the percentages stated.

1,523,201-1,523,215 inclusive. January 13, 1925. **Ingot Mold and Feeder for Ingot Molds.** Bloomfield H. Howard, Washington, D. C., and Ernest J. Turner, Pittsburgh, Pa.

Various types and constructions of feeders for ingot molds and a special ingot mold having a bore therethrough flared outwardly.

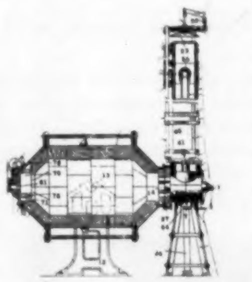
1,523,741. January 20, 1925. **Method of Rust Removal and Prevention.** William Yonkman, Chicago, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y.

A method of rust removal and prevention, consisting in subjecting the rusted surface first to a solution of ammonium citrate and then to a soluble chromate solution.

1,523,980. January 20, 1925. **Treatment of Antimonial Metals.** Frank F. Colcord, New York, N. Y., assignor to United States Smelting, Refining & Mining Company, Portland, Me.

The method of purifying antimonial lead alloys which consists in subjecting the molten alloy to the action of an alkali at temperatures to cause the arsenic in the alloy to unite with the alkali without affecting the antimony.

1,524,397. January 27, 1925. **Smelting Furnace.** Arthur Jones, Belleville, Ill., assignor to U. S. Smelting Furnace Company, Belleville, Ill.



In a device of the class described, the combination with a combustion and smelting chamber, of a fluid fuel burner therefor the point of discharge of said burner being surrounded by protecting walls of refractory material, and an outlet passage surroundieal, and an outlet passage for the products of combustion, said outlet passage surrounding said protecting walls and thus enveloping the burner at its point of discharge into the combustion chamber.

1,524,448. January 27, 1925. **Plating and Method of Accomplishing Same.** James A. Murphy, Lansing, Mich.

A solution for a nickel plating tank comprising the following ingredients in the proportions set forth, to one gallon of water, add from 5 to 12 ounces of nickel ammonium sulphate, 1 to 8 ounces nickel sulphate, ½ to 4 ounces boracic acid, 1/32-ounce sal-ammoniac, 1 to 8 pennyweights cadmium chloride, ⅛ to 2 ounces glycerine.

1,524,470. January 27, 1925. **Process for Recovering Light Metals From Scrap.** Albert Beielstein, Bitterfeld, Germany, assignor to the Firm Chemische Fabrik Griesheim-Elektron, Frankfort-on-the-Main, Germany.

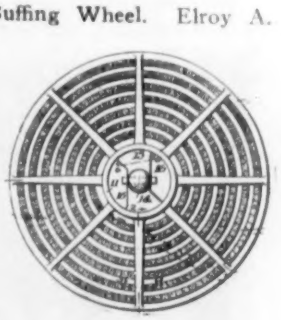
The process for recovering light metals such as magnesium and aluminium from scrap, which comprises melting the scrap metal at an elevated temperature, mixing it with only sufficient fused magnesium chloride to ensure the agglomeration of the foreign bodies and the absorption of any excess of magnesium chloride, stirring the molten mass until the foreign substances have taken up all the magnesium chloride, thereupon causing this mass to settle, and separating the metal melt from the foreign substances.

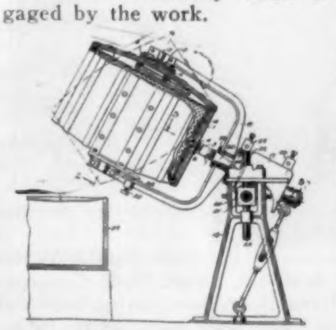
1,525,047. February 3, 1925. **Alloy and Method for Producing Same.** Charles J. Rath, Alliance, Ohio, assignor to Non-Corrosive Metal Company, Oklahoma City, Okla.

An alloy consisting of a substantial amount of copper, not less than approximately 50%, a substantial amount of nickel, not less than approximately 15%, and a small percentage of manganese.

1,525,225. February 3, 1925. **Buffing Wheel.** Elroy A. Chase, Northfield, Vt.

A buffing wheel comprising a rigid rotatable frame and a plurality of flexible buffing elements mounted therein and spaced apart both circumferentially and radially on the face of said wheel, the circumferentially spacing elements being flexible and all of said elements being relatively small in cross-section and being separately yieldable both radially and circumferentially when engaged by the work.





1,525,271. February 3, 1925. **Electroplating Barrel.** Jonh T. Daniels, Newark, N. J.

An electroplating device which includes a tiltable barrel mounted on trunnions, a slidable yoke frame supporting said trunnions, co-operating latch means on the barrel and frame to hold the barrel latched in a definite position while the frame is being rotated.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

Development of the New Centerless Bias Buff

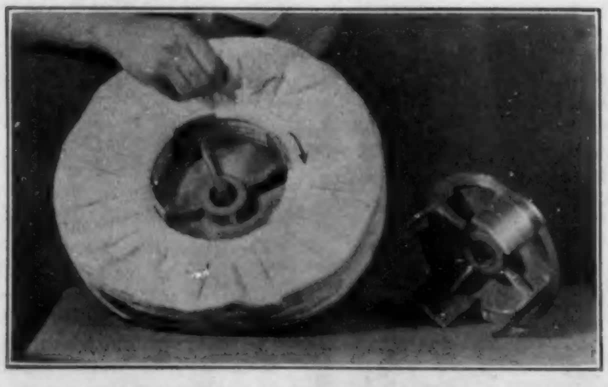
Written for The Metal Industry by H. A. GRANT, Bias Buff & Wheel Company

It is unfortunately true that buffing tools for the polishing trade have not reached the same degree of standardization as many others, for example, the machine tool industry. While the buffing wheel is an old institution and has been in existence as long as metal has been polished, still changes and betterments have been few.

NEW FLANGES FOR THE CENTERLESS BIAS BUFF

The ordinary buff, and this applies to either a loose buff or a sewed buff, has certain inherent defects due to the way the cloth is woven. For this reason it may be well to digress for a moment and describe briefly how all loose buffs are manufactured. The cloth is laid, layer on layer, to about 60 ply depth. The buff is then cut out with a die. Thus the threads in each layer run at right angles to each other, of course, producing a buff that wears square. To obviate this all manufactures of loose buffs turn every layer or every other layer so as to distribute this wear, thus producing a buff that wears round. But the inherent defect is still present. By turning the layers, the uneven wear has been distributed but not eliminated. It was to overcome this basic weakness that the bias buff was developed.

In perfecting their new centerless buff, the Bias Buff & Wheel Company has had available all the resources and facilities of the Riegel Sack Company of Jersey City, employing between eight hundred and one thousand workers, with an outstanding example of a modern up to date plant.



TO MAKE READY A WHEEL, SLIP THE BUFFS ON THE FLANGE

Another advantage that accrues to the Bias Buff & Wheel Company in being associated with the Riegel Sack Company is that the latter company have their own cotton mills at Ware Shoals, S. C., and Trion, Ga., and much of the cloth that is used by the Buff Company is manufactured expressly for them at the mills.

The basic principle of the Bias Buff, on which the company has broad patents, is that the cloth is cut "on the bias." In other words the threads point at approximately 45 degrees to the tangent at any point on the circumference of the buff. This construction means that no threads can fly off; it means that all the threads whip the work, each thread on end and holding firmly embedded its proportion of tripoli.

This construction besides giving the buff greatly increased life, has certain other marked advantages, as for example less physical effort on the part of the operator, a perfectly balanced wheel, and a polishing room that is free from dust and lint, for the reason that in the Bias Buff, 100 per cent of the threads whip the work, whereas in the ordinary loose buff those threads which are parallel to the work fly off. Of this an interesting demonstration was made which will be mentioned later.

In developing the new centerless Bias Buff, it was necessary also to design special flanges to hold it. These flanges, as now furnished, are the result of over two years effort to produce a simple, strong and practical flange. These flanges are arranged so as to hold a flexible number of sections. In other words, if a ten section wheel is needed, the flange because of its adjustability can be arranged to hold from eight to twelve sections. If a five section wheel is wanted, the flange will accommodate from four to eight sections, etc.

16" WHEEL, THROWING OFF PRACTICALLY NO LINT

The new centerless Bias Buff is furnished in the various standard sheetings. It may also be full sewed, but experience has shown that this is seldom necessary for two reasons:

1. With the Bias Buff a greater lathe speed can be used. This, in itself, produces a harder wheel.

2. Because all the threads are working all the time; a wheel composed of Bias Buffs even though unsewed, will be harder than the ordinary buff full sewed.

However, where a particularly hard wheel is needed, sections are alternated, using one sewed Bias Buff and one loose Bias Buff in alternating layers. This results in an extremely hard wheel, which may be necessary for certain types of work.

A most interesting demonstration was staged at the company's plant in Jersey City. Ten sections of the new Bias Buff 14" diameter were speeded up to 2400 R.P.M. and made a wheel of 2⅝" face. Then ten sections of 18 ply loose buffs of the same sheeting, were also run at 2400 R.P.M. and made a face of 2⅜". This means that the Bias Buff gave about ¼" more face at the same cost per wheel. Moreover, the Bias Buff will last at least 25 per cent longer and consume about half the composition of ordinary loose buff.

In connection with this demonstration, which was made before a representative of THE METAL INDUSTRY a wheel of

ten sections of the new centerless Bias Buff was placed on a spindle and the face raked down. It was noteworthy that almost no threads came out and there was little or no dust or lint emerging from the wheel. Then 10 sections of loose buffs were put on the same spindle and also raked down. The result was a cloud of lint and threads pulled out of the wheel. It was a most interesting comparison.

During this demonstration it was explained that one of the seasons why the Bias Buff can be operated at a higher speed than the ordinary loose buff without burning, is that from the nature of its construction a number of little air jackets are formed between the plies of the buff. These air jackets act as insulation against heat.

One of the most important facts to be stressed is that of the cleanliness of the polishing room in which Bias Buffs are used. An example is cited in the fact that a Bias Buff was demonstrated at the Power Show recently held at the Grand Central Palace, New York. This buff was used for polishing the work of other exhibitors at the Show and for general demonstration purposes, **and it was used without a blower.** No annoyance was caused to the other exhibitors or to the visitors, and it was stated by the management of the Power Show that no difficulties of any kind were incurred by the use of this buff without exhaust apparatus. It is obvious that if a buff is so clean that it can be used under certain circumstances even without a blower, should be a great help in safeguarding the health of the polisher at the wheel. It is well known that lint and threads from textiles are not particularly conducive to the health of the workers' lungs, and all steps in this direction are of prime importance.

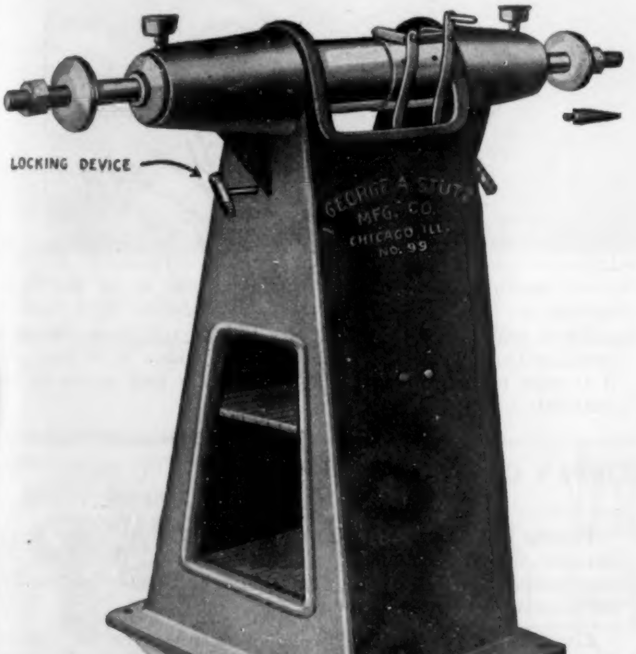
STUTZ POLISHING LATHE

The Stutz No. 99 ball-bearing polishing lathe is said to be a substantial, well-balanced, smooth-running machine built to endure strain, resist wear and defy the dust in long continued usage.

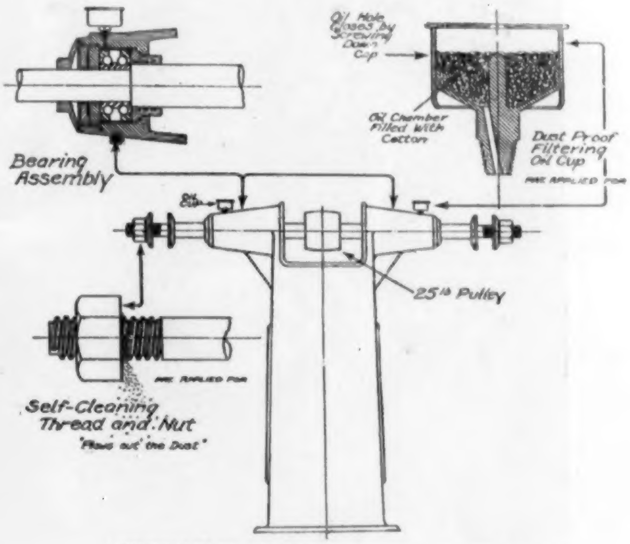
Two sets of double ball-bearings give maximum stability to the shaft with minimum friction and consumption of power.

These bearings are assembled in dust-proof housings, and the oil passes from dust-proof cups through filtering cotton.

A very important detail of construction is the self-cleaning nut and thread on the ends of the shaft. Heretofore much trouble and expense has resulted from the rapid wearing of the threads, due to the penetration of abrasive dust. The nuts would soon fail to hold.



STUTZ POLISHING LATHE



SECTIONAL DIAGRAM OF STUTZ LATHE

Now the self-cleaning threads plow out the dust and save frequent renewals of the shaft.

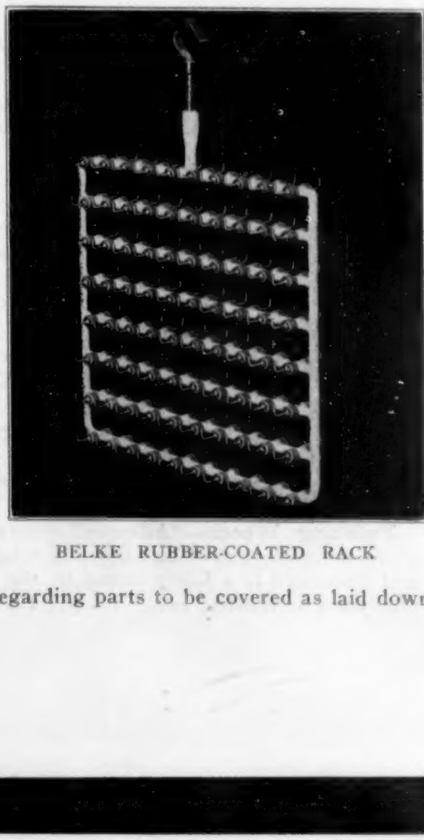
The hollow pedestal has side openings giving access to two interior shelves—a convenient receptacle for tools, etc.

The lathe is built with large flare at back to withstand heavy pressure by men when polishing large and heavy pieces. It has a well designed belt shifter, locking device holds shaft rigid when putting wheels on or taking off. It can be used with drive below or on floor with belt shifter.

This lathe is made by the George A. Stutz Manufacturing Company, 1645 Carroll avenue, Chicago, Ill.

RUBBER-COATED PLATING RACKS

The Belke Manufacturing Company, 2952 West Van Buren street, Chicago, Ill., is putting on the market a rubber-coated plater's rack which, it is claimed, cuts the cost of production in plating. The rubber is hard, acid-resisting and guaranteed to resist cleaners, acids and all plating solutions. The tips are removable (a patented feature).



BELKE RUBBER-COATED RACK

This type of covering saves electric current, metal and the constant replacement of old racks.

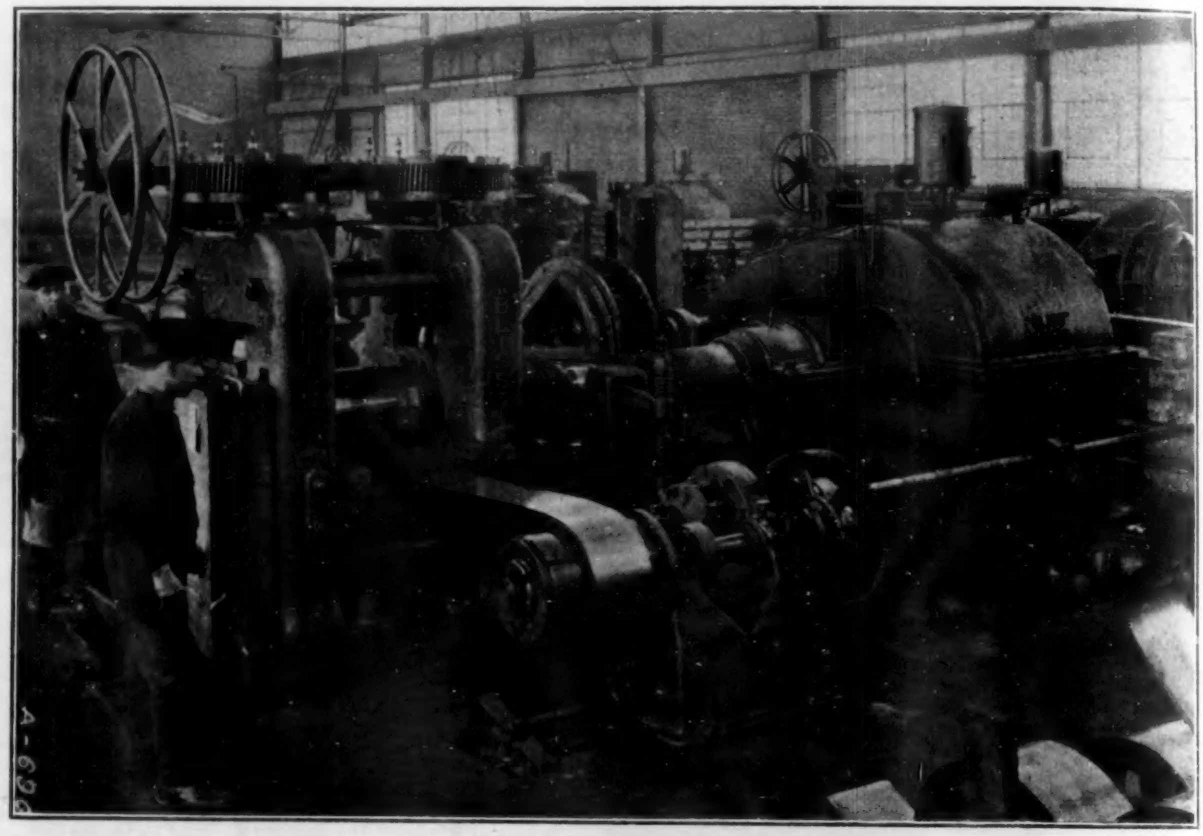
For those who already have enough racks but without covering, the Belke Company, through its hard rubber plant, offers a quick service in covering these racks, following all instructions regarding parts to be covered as laid down by the customer,

COLD ROLLING MILL

The illustration below shows one of the standard cold rolling mills made by the E. W. Bliss Company, of Brooklyn, N. Y. The sizes of the rolls are 16 inches in diameter x 24 inch face. Motor 250 hp. Adjustable speed 400 to 800 revolutions per minute.

In regard to the delivery speed of the mill, this can be arranged so that the non-ferrous metals can be cold rolled at any desired rate of speed up to 350 feet per minute.

One of the principal features of this mill is its screw down for adjusting the top roll. This is so arranged that the operator with ease can adjust the roll while material is being rolled. Another feature is the coiling device which has an automatic expanding and collapsing drum, also a special device for varying the tension in the strip between the coiler and the mill. This tension can be regulated from a few pounds up to 8,000 pounds pull.



BLISS COLD ROLLING MILL

These mills are built in all sizes to cold roll stock starting as small as 1½ inches wide up to 42 inches wide. With these mills it is easy to get at least 50% reduction in four passes on cold material.

EQUIPMENT AND SUPPLY CATALOGS

Grinding and Buffing Machines—Bulletin No. 1582 describes four new types of "Hisey" motor driven combination grinding and buffing machines.

Sherardizing—A folder called Globules, issued by the Globe Sherardizing Company, Cleveland, Ohio, discussing sherardizing and including also a number of amusing items.

Spray Gun—A folder from the Eureka Pneumatic Spray Company, Inc., Richmond Hill, L. I., on the Paragon spray gun, pointing out its points in construction and operation.

Polishing Compositions—"Trulime"—a lime coloring composition for use on nickel, brass and copper is covered in a folder issued by the Hanson & Van Winkle Company, Newark, N. J.

Ampco Metal Golf Clubs—A folder has been issued by Eagrow Company, Milwaukee, Wis., covering its Golden Eagle and Golden Arrow Ampco Metal golf clubs. The folder contains illustrations.

Polishing Wheels—"Advance" canvas, sheepskin, muslin cloth, bullneck, walrus and felt polishing wheels are described and illustrated in a folder issued by the Advance Wheel Manufacturing Company, Inc., Chicago, Ill.

Plating and Galvanizing Equipment—A folder issued by the Meaker Galvanizing Company, Chicago, Ill., describing and illustrating the latest equipment for automatic plating and galvanizing in various industries.

Cleaner—Directions and proportions are given for cleaning floors, walls, windows, kitchen utensils, drain pipes, tile, enameled and marble surfaces, etc., with Greasalt, in a folder issued by Greasalt Products Corporation, New York.

Lacquers—Illustrated cards sent out by the Zeller Lacquer Manufacturing Company, New York, telling in an amusing and interesting fashion how business should be obtained and carried on. The titles are "Last Will and Testament of a Man Who Knew," and "The Little Red Rooster and the Old Black Hen."

Plating and Polishing Supplies—Lasalco, Inc., St. Louis, Mo., have issued an unusually attractive catalog. It is a 180-page book, thoroughly illustrated, describing their full line of products, covering materials, machinery, equipment and supplies. A great deal of valuable technical information is included, such as tables, formulae, etc., making it a very useful book to have in the shop or office.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

BRITISH INSTITUTE OF METALS

HEADQUARTERS, 36, VICTORIA STREET, LONDON, S. W. 1, ENG.

Twenty Americans were elected on December 29, 1924, to membership of the British Institute of Metals. The number of American members of the British Institute of Metals is now 157. It includes many prominent metallurgists in the United States.

The last election of members took place on February 25, 1925. Full particulars can be obtained from the Institute's representative in the United States of America, Mr. W. M. Corse, National Research Council, B and 21st streets, Washington, D. C., or from the secretary of the Institute.

The annual general meeting will be held at the Institution of Mechanical Engineers, Storey's Gate, Westminster, S. W. 1, on Wednesday and Thursday, March 11 and 12, 1925, commencing each day at 10 a. m. Twelve communications are due for presentation at the meeting. The annual dinner will take place at the Trocadero Restaurant on Wednesday, March 11, at 7 p. m. Among those who have accepted the Council's invitation to be present at the dinner are the Rt. Hon. Neville Chamberlain (Minster of Health), the Rt. Hon. Lord Morris (vice-chairman, Imperial Mineral Resources Bureau), and the presidents of many kindred societies.

PAPERS

The following communications are expected to be submitted:

1. Angus, H. T., and P. F. Summers—"The Effect of Grain-Size Upon Hardness and Annealing Temperature."
2. Archbutt, S. L.—"A Method of Improving the Properties of Aluminum Alloy Castings."
3. Bailey, G. L., and R. Genders—"The Density and Constitution of the Industrial Brasses."
4. Bamford, T. G.—"Comparative Tests on Some Varieties of Commercial Copper Rod."
5. Bolton, E. A.—"The Removal of Red Stains From Brass."
6. Bunting, Denis—"The Influence of Lead and Tin on the Brittle Ranges of Brass."
7. Evans, Ulick R.—"Surface Abrasion as a Potential Cause of Localized Corrosion."
8. Friend, J. Newton, and J. S. Tidmus—"The Influence of Emulsoids Upon the Rate of Dissolution of Zinc in Solutions of Lead, Nickel and Copper Salts."
9. Genders, R., and G. L. Bailey—"The Alpha Phase Boundary in the Copper-Zinc System."
10. Honda, Professor Kotaro, and Professor Ryonosuke Yamada—"Some Experiments on the Abrasion of Metals."
11. Isihara, Professor Tomimatu—"On the Equilibrium Diagram of the Aluminum-Zinc System."
12. Norbury, A. L.—"Note on the Effects of Certain Elements on the Electrical Resistivity of Copper."
13. Rose, Sir Thomas Kirke—"On the Density of Rhodium."

AMERICAN ELECTRO-PLATERS' SOCIETY

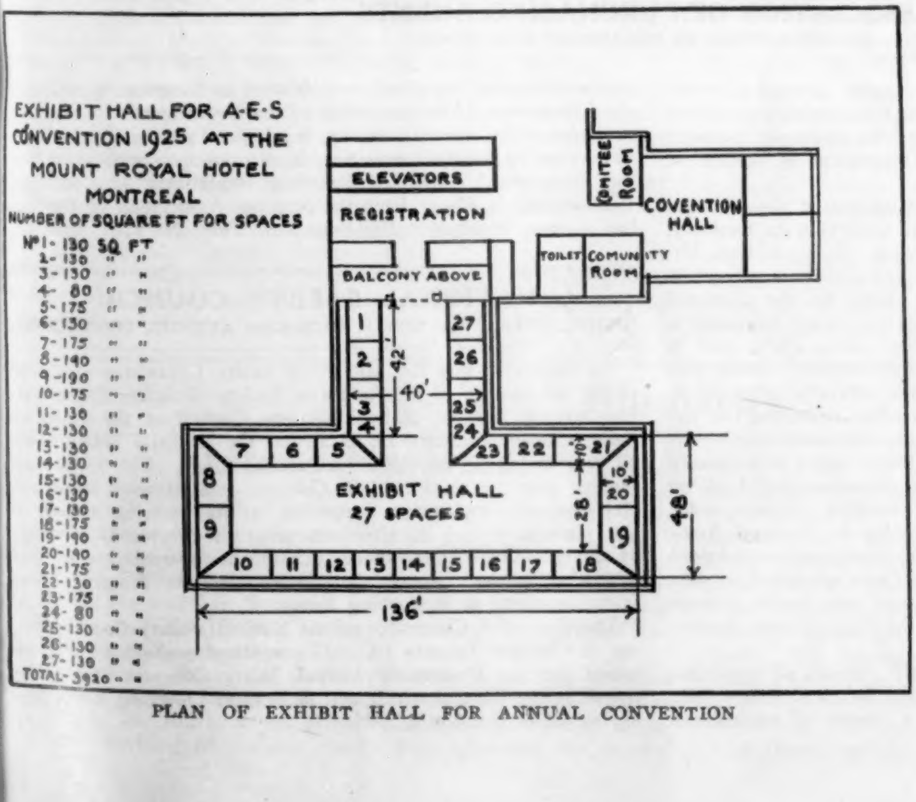
MONTREAL BRANCH

HEADQUARTERS, CARE OF JOHN H. FEELEY, 411 AYLMER STREET

The Montreal Branch is now planning the program for the coming convention to be held on June 29-30, July 1-2, 1925. The American Electro-Platers' Society is an educational one, organized and carried on to educate further the members in the art and science of their industry. It is composed of the leading superintendents and foremen platers of the large industrial plants and job shops throughout Canada and the United States, and has the loyal and active support of the Bureau of Standards, Washington, D. C., as well as the Electro-Chemical Departments of the leading Universities of both countries.

This year the program will be at least as attractive as any ever held, and if possible Montreal will try to excel.

Below is a plan showing the exhibition hall. The society will be able to offer the manufacturers and supply houses an excellent opportunity to display their goods, for all exhibits are together.



PLAN OF EXHIBIT HALL FOR ANNUAL CONVENTION

Arrangements have been made so that all goods from the United States will be held "in bond." Therefore, American exhibitors will not have any worry or expense in respect to customs duties.

BRIDGEPORT BRANCH

HEADQUARTERS, CARE OF G. J. KARL, 126 MANHATTAN AVENUE

Bridgeport Branch will hold its seventh annual banquet at the Stratfield Hotel, Saturday evening, April 18, 1925, at 7 p. m. An educational program will be held at 3:30 p. m., at which papers from members of various branches will be read and discussed.

Dancing and a number of surprises await those who attend. The Banquet Committee consists of N. A. Barnard, G. J. Karl, J. C. Oberender, W. Stratton and R. J. O'Connor.

NEWARK BRANCH

HEADQUARTERS, CARE OF JOHN HEIM, 25 CHESTNUT STREET

The Newark Branch will hold its Annual Banquet on April 25, 1925. George Reuter, of 55 Revere avenue, Hilton, N. J., is Chairman of the Banquet Committee.

PHILADELPHIA BRANCH

HEADQUARTERS, CARE OF PHILIP UHL, 2432 N. 29TH STREET

Philadelphia Branch held its regular meeting on February 6, 1925, with President Gehling in the chair, and a large delegation of members present. Our instructor, J. Kenneth Graham, gave as his lecture and instructions this month the Metal Content of a Nickel Solution, demonstrating the method of arriving at the correct factor with the sodium cyanide and nitrate of silver. Knowing this factor we were able to manipulate the burette in determining the metallic contents of the nickel bath.

This part of the subject became so interesting that it was decided that the members bring to the next meeting, in March, a sample of their solution so as to make comparisons of the amount of metal carried in their solutions for their particular class of work. This will be a beginning towards standardization of the amount of metal best required for their particular line of work.

It is very encouraging to the instructor to see the interest shown by the members in these lectures and also the benefit the members are deriving from them.

The Sustaining Membership Committee reported working on suggestions offered by the members and by our member of the Research Committee.

On account of the illness of Trustee William Bell, S. T. Lumbeck was appointed to fili the office until his return.

Two applications for membership were received. The finances of the branch were found to be in a good healthy condition.

CHEMICAL EQUIPMENT MANUFACTURERS

HEADQUARTERS, 1328 BROADWAY, NEW YORK

Having in the last few months organized, with the endorsement of the American Institute of Chemical Engineers, and assured of success, a first Chemical Equipment Exposition to be held in Providence June 22nd to 27th, inclusive, 1925, the Association of Chemical Equipment Manufacturers announces the inauguration of a six months' pre-show campaign of publicity and education through industrial, technical and university channels, with the importance of chemical engineering, chemical processes and chemical equipment in present-day industrial production as its base.

This association, comprised of makers of equipment used in the various chemical processes in industry of material handling of solids, liquids and gases, heat combustion, heat transfer, refrigeration, crushing, grinding, pulverizing, mixing and agitation, mechanical separation, thickening and settling, filtration, hydraulic separation, centrifugal separation, separation—affecting solids and gases, dissolving, leaching and extracting, evaporation, distillation, drying, precipitation and crystallization, absorption represents a physical valuation among its membership, all of which are American companies, of some $600,000,000.

Public admission is absolutely barred at the Exposition, so that technical men, general executives, purchasing executives, superintendents, laboratory and operating men, owners, etc., etc., of industrial enterprises may have entirely unhampered opportunities to study the relation of chemical processes to their production problems.

Men of the classes mentioned are being informed of the Exposition by individual invitation in cases where their names and company affiliations are known to the equipment manufacturers' association. Any man directly interested, commercially or technically, whose name is not known to the Association, is invited with equal emphasis, the Association announces.

The Chemical Equipment Exposition is supported by such companies as the Buffalo Foundry & Machine Company, the Bethlehem Foundry and Machine Company, General Ceramics Company, United Filters, Raymond Brothers Impact Pulverizer Company, Oliver Continuous Filter Company, Aluminum Company of America, Swenson Evaporator Company, The Dorr Company, Leeds & Northrup, Carbide and Carbon Corporation, American Hard Rubber Company, Linde Air Products Company, United Lead Company, The Pfaudler Company, The Bristol Company, General Electric Company, Tolhurst Machine Company, United States Rubber Company, Duriron Company, Inc., Internatonal Nickel Company and others. The exposition will be held in the State Armory.

ASSOCIATION OF PURCHASING AGENTS

HEADQUARTERS, 233 BROADWAY, NEW YORK

Standard invoice, purchase order, and inquiry forms for recommended use by all branches of American industry and commerce were adopted by a National Conference held under the auspices of the Division of Simplified Practice, Department of Commerce, at Washington, D. C., January 14, 1924.

Since the conference was called at the request of the National Association of Purchasing Agents, W. L. Chandler, its secretary, was asked to make an introductory statement. In his address Mr. Chandler showed that the idea of a standard invoice is not a new one, the movement having starte din 1919 by the National Association of Purchasing Agents. For two years thereafter a joint committee studied the problem from every angle, and in 1921 a national standard invoice form was adopted. Since that time a number of large associations have officially endorsed it, and have put it to actual use. Mr. Chandler submitted the national standard invoice form for adoption by the conference.

After considerable discussion the conference voted unanimously to adopt the standard invoice form for recommended trial by American industry and commerce. The standard purchase order and inquiry forms adopted some time ago by the National Association of Purchasing Agents were likewise considered and adopted by the conference. A standing committee was appointed to consider any objections to these forms which may arise and to arrange for later conferences to review them in the light of their further and wider use.

The Division of Simplified Practice will canvass all organizations and groups interested in these standard forms to secure their approval and adoption. When a sufficient number of ratifications are secured, the forms will be published as American standards in the Elimination of Waste Series of the Department of Commerce.

Copies of the standard invoice, inquiry and purchase order forms as adopted by the conference may be secured upon application from the Division of Simplified Practice, Department of Commerce, Washington, D. C., or from the National Association of Purchasing Agents, Woolworth Building, New York, N. Y.

NATIONAL SAFETY COUNCIL

HEADQUARTERS, 168 NORTH MICHIGAN AVENUE, CHICAGO, ILL.

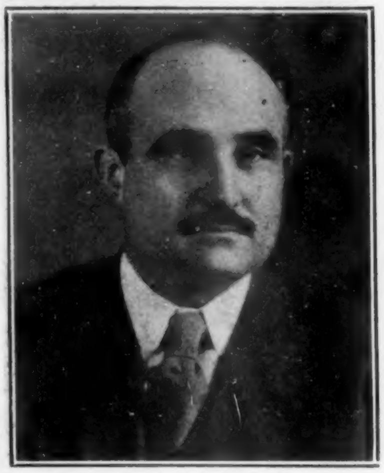
So successful was the Mid-West Safety Conference conducted under the auspices of the American Society of Safety Engineers—Engineering Section, National Safety Council at the Hotel La Salle, Chicago, January 19, 1925, that the National Safety Council will make the conference an annual affair. The recent conference was the third held in Chicago, and attracted more than 400 engineers and plant executives to its morning session on fire prevention and its afternoon program devoted to a variety of safety topics. At the dinner meeting in the evening more than 800 were present, many plant superintendents bringing representatives from their working forces.

The Executive Committee of the National Safety Council meeting in Chicago, January 19, 1925, completed preliminary arrangements for the Fourteenth Annual Safety Congress of the National Safety Council which will be held in Cleveland, Ohio, September 28 to October 2, 1925.

Personals

W. S. QUIGLEY

Wirt S. Quigley is president of Guigley Furnace Specialties Company, which he organized in 1916, and also president of the Bradley Fireproofing Products Company, which was recently reorganized. He has for many years been identified with industrial furnace construction and maintenance and with developments in and improvements in fuel application.



W. S. QUIGLEY

His career as executive and engineer dates from 1895, when for two years he was manager of the Gas Consumers' Association of Philadelphia, having charge of the installation of gas regulators in large buildings and industrial plants.

During 1896 and 1897, as part owner of the Solar Gas Light Company, of the same city, he designed and installed special equipment for the manufacture of incandescent mantles, being also in direct charge of production.

After several months of development work and design of hydrocarbon burners and oil burning appliances in the research laboratory of Joseph A. Vincent, in Philadelphia, he was appointed superintendent of Kitson Hydrocarbon Heating & Incandescent Lighting Company in full charge of research design and manufacture.

Four years' association with the Kitson Company gained for Mr. Quigley a comprehensive insight and knowledge of the brass foundry, stamping and plating business, during which time he originated and patented several oil burning devices and improvements in labor saving tools. During this time he also became financially and actively interested in the plant of the Commercial Tool & Stamping Company, of Woodbury, N. J., during which time he marketed the Charlier Open-Flame Metal Melting Furnace, and later perfected and introduced the Rockwell Double Chamber Melting Furnace.

His long association with the Rockwell Furnace Company, of New York, first as sales engineer and later as vice-president and general manager, gained for Mr. Quigley a wide friendship in foundry circles, which he retains today.

He was vice-president and active in the early days of the Foundry Supply Association and has been a member of the American Foundrymen's Association for many years.

In 1912 Mr. Quigley organized the Quigley Furnace & Foundry Company, of Springfield, erecting and equipping a complete foundry, pattern, machine and plate shop for the new organization.

It was at this time he became actively interested in promoting the use of powdered fuel, being one of the pioneers in this work. Among the plants where powdered coal equipment was installed by this company were the American Locomotive Company, General Electric Company, Burden Iron Company, Lima Locomotive Company, Midvale Steel Company, and St. Louis Screw Company.

In 1916 Mr. Quigley sold his interest in the Springfield plant and organized the Quigley Furnace Specialties Company, of New York, engaged in furnace and fuel engineering and contracting.

The engineering branch designed and erected complete powdered coal plants, internationally known as the "Quigley System" and other furnace equipment, originating the patented "air-transport" method for conveying powdered coal and other pulverized products. Other original devices patented and used in the system are fuel feed controllers, air gates, etc. Plants were installed in England, Italy, France, Belgium and South America as well as in the United States.

Another department of the business entered into the manufacture and sale of refractory materials for industrial furnaces including high temperature cements (Hytempite) and insulating brick.

In 1921 Mr. Quigley sold the engineering branch of the business, but has continued to date the operation of plants at Sayerville, N. J., and Fredericksburg, Va., for the manufacture of refractory specialties, earning for these products a distribution which includes their use in practically every class of industrial plant.

A list of the organizations to which Mr. Quigley belongs includes a large number of fraternal, social and engineering organizations. He is a Mason, an Elk, a Rotarian, (Chairman of the Business Methods Committee of the New York Rotary Club), and a member of the following: American Society of Mechanical Engineers, American Institute of Mining Engineers, American Foundrymen's Association, Engineers' Club of Philadelphia, Manufacturers' Club of Philadelphia, Philadelphia Foundrymen's Association, Machinery Club of New York, New York Railroad Club, Old Colony Club, Columbia Yacht Club and Winged Foot Golf Club.

Bradford Noyes, Jr., is now with the Taylor Instrument Companies, Rochester, N. Y.

Lynn W. Nones has been appointed Eastern sales manager for the Diamond Power Specialty Corporation, in charge of the Atlantic Coast offices from Boston to Charlotte, inclusive. His office is at 90 West street, New York.

George B. Hogaboem is now with the Hanson & Van Winkle Company, of Newark, N. J., as the head of the Technical Department. Mr. Hogaboem is one of our best known platers and is a past supreme president of the American Electroplaters' Society.

Harry Hodgetts, of the Tatesville Silica Sand Company, Everett, Pa., is in charge of the development of greater tonnage of special sands, such as sand blast, filter, furnace, etc., and amorphous silica. He is contemplating installing and changing equipment for production of special sands through processing of crushing, washing and drying.

Obituaries

ALBERT F. ROCKWELL

Albert F. Rockwell of Bristol, Conn., died February 16, 1925, at the age of 64, after an operation for gangrene. Mr. Rockwell was the founder of the New Departure Company of Bristol, the Bristol Brass Company and several other concerns. During the war Mr. Rockwell purchased the Marlin Firearms Company of New Haven, and at the time of the armistice had 13 factories in operation.

Albert F. Rockwell was born near Woodhull, Steuben County, N. Y., on April 8, 1862. He spent his boyhood in Morris, Ill., finishing his school education at the age of 13. After working in various places and capacities for several years, he and his brother Edward D. Rockwell established themselves in Bristol, Conn., in the manufacture of push button door bells. This company prospered and after 5 years Mr. Rockwell sold most of his interests, and organized the Bristol Spring Company. The Bristol Spring Company, however, lived only two or three years, and he went back into the New Departure Bell Company with his brother. They increased rapidly and became interested in a number of varied items. Mr. Rockwell went into the manufacture of coaster-brake improvements, ball bearings, etc. He took a large interest in the Bristol Brass Company, of which he became president. He founded the Marlin-Rockwell Corporation of New Haven for the manufacture of machine guns and had at

one time 15,000 employees on his payroll. He became president and general manager of the American Silver Company and was active in the Standard Roller Bearing Company of Philadelphia, and the Drake and Rockwell Company of Plainville.

Mr. Rockwell took a great deal of interest in civic affairs of Bristol and presented the city with the land which developed into Rockwell Park. He was constantly working for improvements without seeking political office, but he was elected to the General Assembly from Bristol to serve from 1907 to 1909.

Mr. Rockwell was a member of numerous fraternal and social organizations. He leaves a widow, two sons, Lea Rockwell of Plainville and Hugh Rockwell of New York, and one daughter, Mrs. George B. Ward who resides in New Haven.

ALFRED W. FUSSEY

Alfred W. Fussey, a veteran brass manufacturer, dropped dead in his office recently at the Peninsular Brass Works, Detroit, Mich. He was born February 23, 1861. In 1904 he became connected with the Detroit Brass Works and later assumed its presidency. Nine years later Mr. Fussey retired, but after eight months returned to active service as president of the Peninsular Brass Company where he remained until his death.

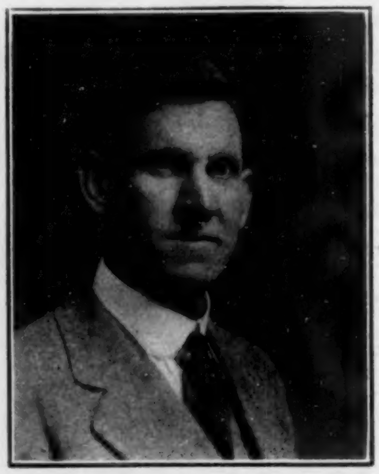
JAMES W. BEARD

James W. Beard died January 1, on board the steamship "Olympic" en route to England on a business trip. Mr. Beard was controller of the International Nickel Company, New York.

WILLIAM F. BAUM

On January 28, William F. Baum, Waterloo, Iowa, president and manager of the Superior Brass Foundry, of that city, dropped dead of heart trouble. He was 57 years of age.

Death was caused by heart disease. He had had recurrent attacks for the past 10 years, but there was no premonition of the fatal attack. He died almost immediately upon falling to the street, a physician stated.



WILLIAM F. BAUM

Mr. Baum is survived by his widow, Mrs. Rose Seliger Baum, and a daughter, Mrs. Leasa Jennish.

Born in Waterloo, February 9, 1867, and lived in that city all his life. His father, John Baum, came to Waterloo with his wife in 1855. W. F. Baum was the third of a family of nine children. At the age of nine years he herded cattle on the prairies adjecent to Waterloo. In 1904 he and W. W. Kauffer founded the Waterloo Brass Foundry which existed until 1907, when Mr. Baum bought his partner's interest. In 1913 he sold out and later organized the Superior Foundry.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

MARCH 2, 1925

The financial statement of the **Scovill Manufacturing Company,** just published, shows a net profit of $1,553,971.45 for the year 1923, which was transferred to the surplus account, making a total surplus of $7,250,392.10. The gross profit from sales for the year was $2,649,931 and in addition there was a miscellaneous income of $566,104. Total assets are given as $33,860,061.17.

But one change was made in the list of officers and directors of the Scovill company at the annual election last month. **George A. Goss** was elected a director in place of **William E. Curtiss,** who died last summer. The officers and directors as elected are: President, E. O. Goss; vice-presidents, John H. Goss, Bennet Bronson and T. I. Driggs; secretary, L. P. Sperry; assistant secretaries, Thomas B. Myers, B. P. Hyde, W. W. Bowers and C. F. Doherty; treasurer, Clayton M. DeMott; assistant treasurers, Frank J. Gorse and W. M. Goss. The board of directors consists of Mark L. Sperry, E. O. Goss, Clayton M. DeMott, L. P. Sperry, Chauncey P. Goss, Jr., William S. Fulton, Frederick J. Kingsbury and George A. Goss.

Announcement was made at a meeting last month of the **Chase Foremen's Association** by **F. S. Chase,** president and treasurer of the **Chase Companies,** that the **Gordon Electric Company's plant,** a subsidiary of the **Chase Companies,** is on the market. Mr. Chase suggested to the foremen that the shop is ideal for any business and that if any of them had any idea of starting a small business his concern would be willing to listen to suitable offers. Present employes of the Gordon Electric plant will be given notice soon of the closing of the plant and an effort will be made to place them in other plants of the Chase interests.

The Gordon Electric Company was brought here from Chicago by **Ira R. Selzer** and **Edward W. Henger.** Both recently left Waterbury for California where they are connected with the Chase Companies of California. Several concerns in the electrical business are big buyers from the Chase Companies and partly because of this, it is said, it was considered wise to halt business as the subsidiary electric shop. The buildings occupied by the company were formerly the plants of the **Waterville Cutlery Company** and the **Welch** Hosiery mill.

The **Scovill Manufacturing Company** has a bill before the present legislature to amend its charter so it may increase its capitalization from $25,000,000 to "any amount, not greater than the net worth of the company." While there have been rumors that the proposed increase was for the purpose of effecting a merger with several other brass and copper companies, it is generally accepted that the increase is no more than that required by normal expansion. By asking that it be made for any amount not greater than the net worth of the corporation, representatives of the company state it will obviate the necessity of going before the legislature every two years for charter amendments to increase the capitalization. The proposed amendment would also allow the company to divide its shares or make them of no par value and to increase the number of its directors.

The **Waterbury Button Company** has already secured from the legislature authorization to increase its capitalization from $100,000 to $1,000,000 and to increase the number of its directors.

The Boston News bureau says of the **American Brass Company:**

"In connection with the expanding consumption of copper the world over, we can state that the bookings of the American

Brass Company will surpass all previous records this month."
—W. R. B.

BRIDGEPORT, CONN.

MARCH 2, 1925

The case of the **Bridgeport Brass Company,** against Tax Collector **Edward A. Drew,** and the city of Bridgeport, is now before the Supreme court of the state, having been originally tried before the Superior court and then transferred to the Supreme court for final decision. The suit is over the reduction of $120,000 in its taxes granted the company on a certificate of error by a former tax collector. The present collector claims the deduction should not have been made and attached property of the company to satisfy his claim.

A new factory has come to Bridgeport, the **Henry Rope & Sons,** which has taken over the entire first floor of the former gun shop of the **American and British Company's** plant on Crescent avenue. It will be used for the assembly and inspection of casement windows manufactured in its factories in Birmingham, England, and shipped to this country, unassembled. Later, the company expects to take more space of the former munitions plant and manufacture here as well as assemble. **William Dee,** of this city, Eastern agent for the firm's product, was responsible for getting the firm to come to Bridgeport in cooperation with the Chamber of Commerce. It has had a plant in New York, but it is being moved here. About 50 men will be employed at the start, but later when a lead shop will be added, several times this force will be employed. Fine craftsmanship in lead products is promised when this shop is started.

Another new firm will be moved into its new quarters in this city this month. **Girard & Company, Inc.,** have taken over the old Hawthorne plant and remodelled it for the manufacture of chemicals and cleaning compounds. About 250 men will be employed when the changes are completed.

An entire department of the new State Trade school building being erected on Sterling street will be devoted to foundry practice in response to the demand by local manufacturers for inclusion of such a course in the proposed new school. Furnaces for the melting of metals such as brass and aluminum will be installed. Bench, floor and machine molding will be taught as well as casting. The new school will cost $200,000 and will accommodate 800 pupils.

The **McNab Corporation,** recently formed to manufacture the new McNab-Kitchen reversing rudder, designed to replace the original straight rudders, has completed temporary arrangements for production to fill orders booked for its products. The **Hamilton Brass Company, General Sheet Metal Works** and the **Automatic Machine Company,** of this city, are stamping, rolling, machining and assembling the new rudders in quantity. This arrangement will suffice until the new firm arranges its distribution and selling organization, when a factory of its own will be built here, President **Alexander McNab** states.

Bridgeport plants continued to show improvement last month, according to figures of the Manufacturers association. There has been an average gain each week in the number of men employed of about 50

Judge L. J. Nickerson, last month, at a hearing of the suit for foreclosure against the **Economy Manufacturing Company,** brought by **Dr. G. H. Wilbur,** fixed the law day for the second Tuesday in March. Dr. Wilbur claims he made a series of loans to the company to tide it over until it had completed a contract for the manufacture of 3,600 toy rifles. He claimed there was due him $1,415 secured by a mortgage note on which he was suing for foreclosure.—W. R. B.

TORRINGTON, CONN.

MARCH 2, 1925

Torrington plants are operating on full time with more employes than were carried back in pre-war days, but the margin of profit for the manufacturer is reduced because the orders, while fairly plentiful, are for the most part small and therefore cost more to ship. Shipments by parcel post and express are larger in number than ever before. One prominent manufacturer in discussing the situation with THE METAL INDUSTRY representative several days ago declared that there are many small orders which are shipped at a loss.

The employment situation here remains about the same. With the opening of spring road work next month, the "floaters" who go from shop to shop seeking work as unskilled laborers, will be absorbed on the road contracting jobs and kept busy until late fall. Practically no new hands have been taken on in local shops during the past month.

The **J. H. Graham Manufacturing Company** has developed a double-tread which is expected to be of special value to manufacturers of bicycle pedals. This company, which was organized only a few months ago, is gradually increasing its working force.

James Hartness, former governor of Vermont and at one time employed at the **Union Hardware** plant, addressed a recent meeting of the **Torrington Club.** He predicted that business must constantly get nearer to mass production and mass distribution and deplored the practice, all too frequently indulged in, of slamming "big business." Mass production and mass distribution, he declared, benefits not alone the manufacturer but the worker and the consumer.

Compensation Commissioner **F. M. Williams,** in handing down a recent decision in a case involving an employe of one of the Torrington metal industrial plants, took occasion to criticize first aid men, who are not full fledged physicians and who are prone to assume too much concerning the extent of injuries sustained by workers. The case which he decided involved a claim for compensation for injury to a worker's eye. The first aid man did not consider the injury serious apparently but a physician who was called into the case some time later found that the patient has lost 90 per cent of his vision. The claimant was awarded $1,083.68.—J. H. T.

NEW BRITAIN, CONN.

MARCH 2, 1925

The outstanding features in the metal manufacturing industry in New Britain this month has been the annual meeting of the **New Britain Machine Company,** at which an encouraging report was presented, and the action of the stockholders of the **Stanley Works** in voting to retire 25 per cent of the preferred stock. Otherwise business pursues the even tenor of its way. Business conditions are certainly quite good and the outlook for spring trade is encouraging. The **Landers, Frary & Clark** plant is increasing its production of electrical goods and at the same time is cutting down wherever possible on other lines that do not offer as good business opportunities. This is especially true of the cutlery line. The **North & Judd Manufacturing Company** reports several substantial orders received and the **Traut & Hine Company** is proceeding with a better outlook than it has had for some time. The various branches of the **American Hardware Corporation** are working on a full time schedule and demand for builders' hardware seems good. Foreign trade also is picking up.

The **New Britain Machine Company,** which all but went into the hands of a receiver following the war, reports that during the past year the deficit was reduced by $258,545.45 and the net current assets are $298,750.66 greater than they were December 31, 1923. Substantial progress toward obtaining a settlement from the government on war contracts has been made. In connection with the annual meeting day, Berry and Reynolds, attorneys for the preferred stockholders, and Robinson, Robinson and Cole, lawyers for the common stockholders, announced a plan to entirely eliminate the company's deficit which would allow for payment of dividends later on. This plan will be voted on later.

The Stanley Works common stock has been increased from $6,500,000 to $10,400,000 and a dividend on the new issues at 2½ per cent, payable April 1, has been voted.

The **Hart & Cooley Manufacturing Company** has reelected its old staff of officers and voted a regular dividend of 4 per cent.

Summing up the situation briefly, the concensus of opinion is that business will be materially bettered in all lines during the next two months and the spring output will be increased materially.—H. R. J.

PROVIDENCE, R. I.

March 2, 1925

Peerles Sheet Metal Works, 874 Broad street, Providence, are owned by Thomas R. Sainsbury, according to his statement filed at the city clerk's office.

The report presented at the annual meeting of the stockholders of the **American Screw Company** on Feb. 10, reviewed the business of the company during 1924 which as a whole had not realized the full return of activity anticipated at the beginning of the twelve months. The report also stated that while disposed to be guarded in expressing expectations for the coming year, conditions in general were more favorable than a year ago, and justified the outlook for a better year in 1925 than in 1924. The following were elected as the Board of Directors for the ensuing year: Samuel M. Nicholson, John Russell Gladding, George W. Thurston, Marsden J. Perry, Benjamin Thurston, Paul C. Nicholson, Byron S. Watson and Henry A. Taylor. At a meeting of the directors, following the stockholders' meeting, officers of the corporation were chosen as follows: President, Samuel M. Nicholson; Vice President, George W. Thurston; General Superintendent, Benjamin Thurston; Assistant General Superintendent, Benjamin R. Thurston; Treasurer, Albert M. Dunham; Assistant Treasurer, E. William Lane; Secretary, Ernest I. Casada; Assistant Secretary, George F. Staples; Sales Agent, Albert B. Peck; Western Sales Agent, Henry A. Taylor.

Henry D. Sharpe, treasurer of the **Brown & Sharpe Manufacturing Company** of this city was elected a director of the Chamber of Commerce of the United States at a recent meeting at Washington, D. C., for the unexpired term ending in 1926.

Belcher & Loomis Realty Company of Providence, has filed notice at the office of the Secretary of State of an increase in capital stock from $100,000 to $500,000. This is the corporation in whose name the real estate belonging to the **Belcher & Loomis Hardware Company** is held.

Stockholders of the **Nicholson File Company** held their annual meeting Feb. 11 at the office of the corporation, 23 Acorn street at which Samuel M. Nicholson, President, reviewed briefly business conditions of the country with reference to the file industry. The stockholders elected the following directors for the ensuing year: Samuel M. Nicholson, Paul C. Nicholson, Marsden J. Perry, John Russell Gladding, Byron S. Watson, Ernest S. Craig and August E. Saunders. Later the directors elected for the following officers: President and General Manager, Samuel M. Nicholson; Vice President and Treasurer, Paul C. Nicholson; Secretary and Assistant General Manager, Ernest S. Craig; Assistant Treasurer and Cashier, Henry W. Harman; Assistant Treasurer, Albert J. Dana; Assistant Secretary and Manager of Credits, Augustus E. Saunders; Domestic Sales Manager, Wallace L. Pond; Foreign Sales Manager, E. Foster Hunt; Assistant to President, Robert W. Hathaway.

Industrial corporations of Rhode Island to whom charters were granted under the laws of the State during the past month included the following:

Kestenmen Brothers Manufacturing Company, Providence, manufacturing jewelry; capital stock 300 shares of common stock without par value. Incorporators: Abraham Kastenman, Max Kastenman and Charles H. Lawes.

Marvel Manufacturing Company, Providence, manufacturing jewelry and novelties; capital stock $50,000 in 500 shares of common stock of $100 each. Incorporators: Harry J. Gluskin of 276 Fifth avenue, New York City, and Myron Slater and J. G. Silberstein of Providence.

G. L. Vose, Inc., Providence, manufacturing jewelry; capital stock 500 shares common stock without par value. Incorporators: Joseph E. Conley, Frank T. Downing and George W. Bugbee all of Providence.

A. G. S. Company, of Providence, manufacturing jewelry and novelties; capital stock of 1000 shares common stock without par value. Incorporators: Ralph M. Greenlaw, C. E. Waterman and C. L. Barnfield.—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

March 2, 1925

February is closing as one of the dullest months on record, insofar as business conditions have been figured in recent years. Since December there appears to have been a steady decline in activity, especially in those establishments who are largest users of non-ferrous metals. Inquiry about the city has failed to develop causes therefor, or predictions as to when the backward trend will change front.

While it is known that production in most of the large plants about the city has shown an increase since the beginning of the year, the demand for metals has practically stood still. There is no demand for brass workers in the city, and business in the brass foundries about town is very dull. Predictions were made during the holidays that the new year would witness a sharp revival in the metal trades, but thus far the movement appears to have been a retrograde affair.

Here and there bright spots appear in the local business horizon. The big plant of the **General Railway Signal Company,** in Lincoln Park, are very active, having received large orders for railway equipment of late. This plant is a large user of copper, brass, bronze, aluminum and nickel. Both the **Eastman Kodak** and **Bausch & Lomb** optical plants show no improvement over the previous month. The can companies are fairly active, owing to the approach of spring and the accompanying demand for their products.—G. B. E.

NEWARK, N. J.

March 2, 1925

Future possession of the **Butterworth-Judson** plant here rests on the decision of Judge Hand in the United States District Court in the Southern District of New York. The receivers' sale of the seventy-seven acres of property has been concluded and the bids will be submitted to the court for approval and selection. **William H. Lewis,** of Chicago, president of the **F. J. Lewis Manufacturing Company,** made the high bid of $757,000 on the property as a whole.

A voluntary petition in bankruptcy has been filed in the Federal Court by the **Milo Manufacturing Company,** manufacturers of radio equipment. Liabilities of $36,194 and assets of $8,882 are specified. In the petition the company declares that the plight of the concern is due to the competition which has arisen in the radio industry during the last few months.

Zenith Electrical Supply Company, Inc., manufacturers of electrical supplies, has been incorporated with $50,000.

Victaulic Company of America has been chartered with $300,000 capital to conduct a foundry and machine shop at Newark.

R. and H. Platinum Works, Inc., of Perth Amboy, N. J., has been chartered with $500,000 capital to manufacture platinum products.

The **New Jersey Lamp Works,** of 21 William street, Newark, N. J., claiming the ownership of a patent on an auto radiator, is to receive an accounting from the **American Superior Radiator Company.** In a suit tried before Federal Judge Bodine, **Harry** and **Abraham Bichunsky,** owners of the radiator company, were charged with having infringed on the patents held by the lamp works concern, which also obtained from the court a permanent injunction against the Bichunskys, preventing the latter from manufacturing the radiators.

The stockholders of the **Factory Placement Company** will hold a meeting to determine whether they will accept the offer for the purchase of the property taken over from the **Aluminum Wheel Company of America,** of New Brunswick, N. J.

John G. Ruckelshaus, Inc., of Newark, N. J., has been chartered with $100,000 capital to manufacture radio supplies.

E. M. Wilson & Son, to manufacture radio machinery, was incorporated with 1,000 shares preferred and 1,000 shares no par.—C. A. L.

TRENTON, N. J.

March 2, 1925

Preliminary steps in an effort to devise a plan whereby the J. L. Mott **Company,** now in the hands of receivers, will be placed on a solid financial basis, will be taken at a hearing to be held in the United States District Court when the receivers, **Charles H. Baker** and **Robert K. Bowman,** will show cause why a petition of the creditors should not be granted.

The petition has been made by **Mrs. Marie MacLean,** of New York, who holds a large amount of the company's securities. She owns 7,645 shares of common stock of the total of 26,947 shares of common stock and 6,039 of the 9,644 shares of preferred. She also holds $449,000 worth of the company's bonds and is a creditor in the amount of $300,000. Mrs. MacLean had been for some time earnestly engaged in an attempt to reconstruct the finances of the company and may succeed without the sale and liquidation of the assets. She has also interested bankers and financial houses in the rehabilitation of the company and wants the banking and merchandising creditors paid in full. It is said that competent engineers will be engaged to go over the physical assets and property of the company and public accountants secure statements of the company's operation during the past ten years. An order for the creditors and stockholders to show cause why the proposed sale of 665 shares of stock held by the company in the Mott Company, Ltd., of Canada, should not be approved and confirmed is still pending.

Flames originating from an overheated motor recently caused considerable damage in the big brass shop of the **J. L. Mott Company.** The blaze started in the tool room a few minutes after the employed had quit for the day. The tool room had to be closed for a day until repairs were made. The foundry, monitor and assembling departments and shipping room, situated in the same building, escaped damage.

Frederick T. Katzenbach, of Trenton, N. J., who recently filed a voluntary petition of bankruptcy in the United States District Court, has been adjudged a bankrupt. His liabilities were given as $102,597.41 as against assets of $3,375. Mr. Katzenbach was associated with **Edward L. Bullock** in the firm of **Katzenbach & Bullock,** chemical dealers, Trenton, N. J.

The **Trenton Folding Metal Chair Company,** of 115 South Warren street, Trenton, N. J., has been chartered to manufacture metal chairs of all descriptions. **John D. Lawrence,** of Princeton, and **William A, Jackson** and **John C. Applegate,** of Lawrenceville, N. J., are the incorporators.

The **John E. Thropp's Sons, Inc.,** has been chartered at Trenton, N. J., to acquire the present foundry business conducted under the name of John E. Thropp. Capitalization is 5,000 shares of no par value. The incorporators are **John E. Thropp, 3rd; James W. Thropp** and **H. A. Sutterley,** all of Trenton.—C. A. L.

PHILADELPHIA, PA.

March 2, 1925

Quiet ruled the metal market in Philadelphia in February with prices tending downward. Two national holidays occurring ten days apart had a slowing up influence on trading. In the early part of the month electrolytic copper was slow and domestic consumers did not show much interest in offerings. At the close of the month, however, consuming factors came into the market for fairly large supplies at low prices and trading gradually gathered momentum. Prime Western zinc is quiet with consumers showing little interest in present offerings. Week to week trading in lead revealed lower prices until the market was last quoted at 9.25c., which was a decline of .50c. since the early part of the month. Even under this steady decline consumption was small. Tin also remained quiet with consumers showing no interest beyond immediate requirements. Nickel prices remained firm throughout the month but very little business was transacted. In aluminum, virgin metal, remained firm at prevailing levels and consumers bought sparingly.—A. F. C.

PITTSBURGH, PA.

March 2, 1925

Business conditions in the metal industries throughout Western Pennsylvania are normally active, with labor well employed. An early resumption of industrial activity has materially strengthened the employment situation in the important industries throughout Pennsylvania. The year end suspension of operations was less pronounced than usual.

Railroad car building, locomotive works and repair shop employment schedules remain fairly steady.

Machinery, automobile and accessory plants are gradually emerging from the dull period of the last few months.

Hardware is in stronger demand with some advances in prices noted.

The **Pittsburgh Transformer Company** plans new plant building which will cost approximately $200,000, in Juniata street near Preble avenue, Northside. It will be one-story high, 162 by 450 feet. The Austin Company, of this city, has been awarded the contract.—H. W. R.

MIDDLE WESTERN STATES

INDIANAPOLIS, IND.

March 2, 1925

The **Superior Nonferrous Foundry Company,** of South Bend, Ind., has been incorporated to conduct a general foundry business. The incorporators are: Clarence C. Walters, Hope P. Walters and Anna I. E. Walters, all of 601 East Dayton street, South Bend, Ind.

The **Hoosier Foundry Company,** of Indianapolis, Ind., has filed articles of incorporation to do a general foundry, shop and machine shop business, also to engage in the manufacture of all kinds of metal castings. The incorporators are: **Edward S. Workman, George Workman** and **Charles E. Hall,** all of Indianapolis.

The **Engman Range Eternal Company** has been incorporated at Elkhart, Ind., with a capital stock of $300,000 to manufacture stoves, ranges and heaters. The incorporators are: Silas McClure, Minneapolis; Elias H. Bottun, Milwaukee, and Harry A. Engman, Jr., Goshen, Ind.

The plant of the **Engman Matthews Range Company,** at Goshen, Ind., estimated to be worth $500,000 as a going concern, has ben sold to **Silas McClure,** of Minneapolis, Minn., for $103,500. This sum was paid to the committee of Chicago and Goshen bankers which has managed the industry since it became involved financially two years ago. The banks will realize about 40 cents on the dollar.—E. B.

DETROIT, MICH.

March 2, 1925

Announcement has been made in Detroit by **Lawrence D. Buhl,** capitalist, of the formation of the **Buhl-Verville Aircraft Company** for the manufacture of high-speed aeroplanes, in a part of the plant of the **Duhl Stamping Company.** Detroit already has in operation the **Stout Metal Airplane Company** and the **Aircraft Development Corporation,** backed by local capital and in which the Fords are interested.

The **Commonwealth Brass Corporation** is now employing 150 men and plans, it is stated, to add about 50 more during the year.

The **Clayton & Lambert Manufacturing Company** reports that orders show a substantial increase over those of a year ago at this time. Contracts have been let for most of its raw materials. The company is now employing about 1,500 men and plans, it is stated, to increase this force about 20 per cent during the year.

The **Zeldes Smelting & Refining Company** is now employing 12 men and reports orders are coming in well. It is in the market for scrap metals.

The **Brown-McLaren Manufacturing Company** is reported in the market for brass and steel rods. It reports business improving and is now employing 190 men.

The **Roberts Brass Manufacturing Company** reports it will

take on 185 additional men during the year. It now is employing 415. Prospects for 1925 are regarded as favorable.

Executives of the **Detroit Acme Brass Works** believe that 1925 prices will be made by the manufacturer and not by the buyer, as in 1924. This company is reported in the market for copper and brass. It is now employing 150 men.

The merger is announced of the **Standard** and **Peninsular Brass Works,** of Detroit, under the name of the **Standard-Peninsular Brass Works.** This organization is engaged in the manufacture of cocks, valves and fittings for ranges; hot plate water heaters, cocks, valves and brass parts for automobiles and similar sundry brass parts. The officers are: **F. G. Austin,** chairman; **H. R. Brownell,** president; **P. E. Welton,** vice-president; **C. L. Parsons,** secretary-treasurer. Offices and works are at West Warren and Walton avenues.

The **Great Lakes Engineering Works,** now employing 1,107 men, reports it will add 500 more to that number during the year. It is stated it will be in the market for brass goods and other metal products.

The **Art Metal Company** has recently been organized at Lansing for the purpose of manufacturing and dealing in all kinds of automobile specialties and parts. The stockholders are: **J. W. Wilford, L. A. Wilford** and **E. C. Shields.** The address is 1017 Kalamazoo street E., Lansing.—F. J. H.

CHICAGO, ILL.

March 2, 1925

Metal dealers in the Chicago region describe business during the past few weeks as "picking up." The hopeful impetus and rush with which the trade began the year was suddenly checked toward the latter part of January and the early days of the following month, but a gradual improvement that set in shortly after has made itself quite evident.

George Birkenstein, of the **Globe Metal Company,** declares business with that company has been altogether fair. **R. G. Raphael,** of the **Federated Metals Corporation,** predicts that the present situation will not persist much longer and the activity in the industry will soon begin to approach the optimistic points which have been anticipated. **W. P. Carroll,** of the **National Lead Company,** believes business will improve considerably soon. Stocks are low, he declared, and the general outlook is favorable.

Prices of waste materials at the present time have been receding, with buying slow in all lines. Old metals are extremely quiet and all grades are lower. The reduction of $5 a ton in lead made by the **American Smelting and Refining Company** has weakened scrap lead quotations and dealers have been waiting further developments. Copper prices have tended downward, while tin and antimony have been a little high.

The **Western Division** of the **National Association of Waste Material Dealers** held a meeting in the Crystal Room of the Hotel Sherman on Tuesday, February 10. **Benjamin Harris,** of **Benjamin Harris & Company,** chairman of the Western Division, presided at the session, which was attended by forty-five men representing twenty-five different companies.

The attention of the men was chiefly devoted to a discussion of the general situation of the industry with special reference to the traffic problems of the western men. It was suggested that the traffic manager of the association be placed in Chicago in the interests of the western members. A discussion of the necessary changes in the standard classifications of old metals was also held.

Louis Birkenstein, president of the **Globe Metal Company,** addressed the members, outlining in general the work of the association and some of the problems which the men could consider.

The next meeting of the division was planned for Tuesday, May 5, and it was suggested that tri-monthly meetings be a regular activity of the western association. Details of the next meeting will be in charge of **L. G. Messinger,** of the **Federated Metals Corporation,** secretary of the Western Division.

The remarkable success of the National Automobile Exposition held in Chicago at the Coliseum during the last weeks of January has been accepted by the metal men as a happy indication of the prosperity which the auto men will enjoy during the present year, with its consequent business for the metal industry.

Henry Greenwood, tinplate expert, died recently at his home of a stroke of apoplexy. Mr. Greenwood, who was 65 years old, had been associated with the **American Can Company** for the past twenty-five years, and for twenty-seven years prior to that was with the **Chicago Stamping Company.** Mr. Greenwood was with the **Chicago Stamping Company.** Mr. Greenwood was born in Denmark and while still a youth entered the tin industry. He is survived by three married daughters and four grandchildren.

The **Illinois Merchants' Trust Company** was recently appointed by the Probate court here as conservator of the estate of **William R. Manierre,** prominent Chicago metal manufacturer, after a jury had declared the aged man incompetent to manage his affairs. The estate is conservatively valued at $1,000,000. Mr. Manierre, who is 78 years old, has been ill with paralysis in a local hospital for some time, but was lately permitted to return to his home. He is a pioneer resident of Chicago and has been prominently associated in the metal manufacturing business for years.

In a half million dollar fire which recently destroyed the Traynor building at 122 South State street, the United States Smelting Works suffered considerable loss. The company had occupied the sixth and seventh floors of the building, the entire interior of which was burned out. **Reiffell and Husted,** silversmiths, who occupied a portion of the second floor of the same building, also incurred a loss of several thousand dollars. The origin of the fire was undetermined.

The **Kelly Brothers Manufacturing Company,** 3347-49 South Michigan avenue, makers of aluminum castings, also had their plant damaged considerably by fire recently.

Charles E. Field, manager of the Chicago plant of the **National Lead Company,** and **F. A. Gregory,** chief of the white lead department, have gone to New York to attend a meeting of the board of directors of the company. **H. J. McBirney,** assistant manager of the Chicago office, is in Paris, France, on a three months' tour of the Continent.

Charters recently granted by the Secretary of State of Illinois of interest to the metal trade include:

The **Funk Forging Company,** Seventeenth street and Fifth avenue, Chicago Heights, Ill., capitalized at $50,000, to manufacture and deal in tools, forgings, commodities of steel; iron, metals, etc. The incorporators are **George H. Funk,** J. T. **Powers** and **Fred Miller.**

I. Lanski & Son Scrap Iron Company, 3465 South Lawndale avenue, capitalized at $250,000, to manufacture and deal in iron, steel, manganese, copper, and other metals and merchandise. The incorporators are **Jacob J. Abe, H. Lanski** and **Samuel Lanski.**

The **Ferru Manufacturing Company,** Chicago, recently announced the change of its name to **The Gossard** Radio and **Wire Company.**—L. H. G.

Business Items—Verified

Hellvik Studios, designers, sculptors and moldmakers, have removed to 154 Spring street, New York, N. Y.

The **Bunting Brass & Bronze Company,** Toledo, Ohio, has almost completed a new extension to its works.

Paul Siptrott, manufacturer of molds for art metal castings, has moved from 5 W. 14th street, to 157-201 Centre street, New York City.

Contrary to the published report, the **International Nickel Company,** New York, has not acquired the plant and property of the **British-America Nickel Corporation.**

The **Melita Art Metal Company** has moved from 373 Canal street to 135 Wooster street, New York City. This company manufactures cast metal lamps and clocks.

F. R. Zierick Machine Works have removed from 207 Canal

street to 6 Howard street, New York City. They manufacture copper terminals and radio parts and do job stamping.

Worcester **Foundry Riddle Company,** 166 Union street, Worcester, Mass., plans to manufacture riddles for foundries and jobbers. It will be in the market for necessary materials.

The Jefferson **Plating & Polishing Works** are now located at 427 E. 115th street, New York City. This plant specializes in hotel plumbing and contract work in nickel, brass and silver.

Metropolis **Metal Spinning & Stamping Company** has removed to 149-153 Wooster street, New York City. This concern does spinning and stamping for the trade in all kinds of metals.

E. Ingraham **Company,** N. Main street, Bristol, Conn., manufacturer of clocks and clock movements, has acquired 3½ acres opposite its present plant to be used for later expansion.

Fire destroyed a portion of the factory of **Sturdy Brothers,** Chartley, Mass., manufacturers of jewelry and novelties, January 28, 1925, but repairs are going rapidly forward and it will soon be back in order.

The report, published elsewhere, that the plant of the **American Magnesium Company,** Niagara Falls, N. Y., will be converted into a factory for the manufacture of aluminum automobile bodies is incorrect.

Fred Roettges has moved his shop from 331 West Broadway to 45-51 Lispenard street, New York City. He specializes in designing, modelling and mold making for the silverware and lighting fixture trade.

The **Presto Metal Stamping Corporation** is now located at 194-198 Greene street, New York City. This concern manufactures locks and metal trimmings and operates the following departments: stamping, plating, polishing, lacquering.

The **Sunrise Lamp Manufacturing Company, Inc.,** is now located at 351 Canal street, New York, and manufacturing boudoir and table lamps, hall lanterns. It operates the following departments; casting, soldering, spraying, lacquering.

Hill & Griffith Company, Cincinnati, Ohio, has opened an office and factory at 4606-10 West Sixteenth street, Chicago, Ill. **M. Z. Fox** is resident manager in charge of the branch and is assisted by **W. J. Adams, J. H. Lyle** and **Peter Byrne.**

The **Fulton Company,** Knoxville, Tenn., has completed its new building, replacing one burned last fall. This firm operates the following departments: brass foundry, brass machine shop, tool room, grinding room, plating, soldering, polishing.

The **Weston Electrical Instrument Company,** Newark, N. J., has changed its name to the Weston Electrical Instrument Corporation. This firm operates the following departments: tool room, grinding room, plating, jappanning, stamping, soldering, polishing, lacquering.

Gilby Wire Company, Newark, N. J., has moved its offices from 108 Adams street to 123 Jackson street. The space acquired has been utilized for the installation of additional heavy wire-drawing equipment, annealing and cleaning equipment. **W. B. Driver** is president of the company.

Gibb Welding Machines Company (successors to Gibb Instrument Company), of Bay City, Mich., manufacturers of electric welding equipment, announces the appointment of the Welding Service & Sales Company, Donovan Building, Detroit, as agents. T. M. Butler is manager.

J. Sotnick and **H. Chapnick** have opened a shop at 502 W. Broadway, New York, N. Y., to be known as the **Superior Plating Company.** They will specialize in metal novelties in gold, silver and antique finishes. The following departments will be operated: plating, polishing, spraying, lacquering.

The **Empire Brass Manufacturing Company,** London, Ont., Canada, is in the market for a No. 7 manufacturers' equipment, collapsible tap. This firm operates the following departments: brass, bronze foundry; brass machine shop, tool room, grinding room, plating, japanning, soldering, polishing.

Doehler **Die Casting Company,** Pottstown, Pa., has removed the white metal die casting department from its Brooklyn plant to the local works and is adding more than 35 new machines for this department of the business. The local plant will be extended, giving employment to approximately 400 men.

C. L. **Frost & Son,** 30 Ionia avenue, S. W., Grand Rapids, Mich., manufacturers of hardware products, have awarded a general contract to the Paul A. Mastonbrook Company, Michigan Trust Bldg., for its proposed addition, to be one-story and basement, 60 x 100 ft. This firm operates the following departments: tool room, stamping.

Luner Lighting Fixture Corporation has started business at 17-19 Bleeker street, New York City. This concern manufactures floor and table lamps, as well as cast and spun novelties in brass and copper, such as smoker's articles. This firm operates the following departments: casting, spinning, polishing, soldering, plating and lacquering.

Pacific Spring Company, 900 High Street, Oakland, Calif., has added a new department designed and equipped to manufacture valve springs, specialty coils and special springs. Machinery is being installed and the new plant is now in full operation. **Curtis Wright** is general manager. This firm operates the following departments: tool room, grinding room, japanning, stamping.

The **Federated Metals Corporation** announces that **C. S. Dunbar,** who for the past 10 years has been connected with the **Whipple & Choate Company** of Bridgeport, Conn, as assistant manager and later manager, is now associated with the Federated Corporation in the capacity of superintendent of the Newark, N. J., plant for the making of brass, bronze and composition ingot.

The **Scovil Manufacturing Company,** Waterbury, Conn., reports for 1924 net profit of $1,553,971, equal to $8.77 a share on the 177,000 shares of stock. This compares with a net of $3,167,761 in 1923, equal to $17.89 a share. Current assets at the end of 1924 totalled $19,940,868, and liabilities $2,574,074. Of the assets cash amounted to $1,664,653 and government and other marketable securities $7,163,769.

The **Wayne Tank & Pump Company,** Fort Wayne, Ind., has acquired the plant and business of the Continental Oil Burner Company, Chicago, and will consolidate with its organization. It is proposed to remove the Chicago business to the Fort Wayne plant, where a department will be equipped for oil burner production. This firm operates the following departments: tool room, grinding room, galvanizing.

A. F. Fort, formerly connected with the **Wabash Foundry Company,** Wabash, Ind., has purchased the **Paul Smith Brass Foundry,** 564 W. Randolph street, Chicago. Mr. Fort will represent the Wabash Foundry Company, and also the Mid-West Foundry Company, Galesburg, Ill., in Chicago. This firm operates the following departments: brass, bronze and aluminum foundry; grinding room, casting shop.

Simon Guggenheim, president of the **American Smelting & Refining Company,** and former United States Senator from Colorado, and his wife, have announced a preliminary gift of $3,000,000 for the endowment of the **John Simon Guggenheim Memorial Foundation Fellowships** for advanced study abroad. The purposes of the Foundation are to improve the quality of education and the practice of the arts and professions in the United States, to foster research, and to provide for the cause of better international understanding.

At the annual meeting of the **Niagara Falls Smelting & Refining Corporation,** held at Buffalo on February 7, the following officers were appointed: **William R. Hopkins,** attorney-at-law and city manager of Cleveland, as president; **Ernest G. Jarvis,** vice-president and general manager; **Howard O. Babcock,** secretary; **A. G. Maddigan,** treasurer, and the above with **Paul A. Schoellkopf,** president of the Niagara Falls Power Company, constitute the directors. **Paul H. Wilkes** was appointed assistant treasurer in charge of accounting.

The **Joseph Dixon Crucible Company,** Jersey City, manufacturer of graphite products, pencils, lubricants, crucibles and paint, announces the removal of its Boston office from 49 Federal street to 80 Federal street—the new Chamber of Commerce Building. The staff of the Boston office consists of **H. A. Nealley,** district representative, looking after lubricant and paint sales; **Guy W. Hart** and **William E. Haggerty,** pencil sales; **Charles A. Shaw** and **R. H. Brinkerhoff,** crucible sales, and **J. W. Loftus,** lubricant and paint sales.

The foundry of the **Hertzler & Zook Company,** Belleville, Pa., which was destroyed by fire on September 27, has been replaced by a modern fireproof foundry building completely equipped with modern machinery in accordance with advanced production methods. The foundry furnishes iron, brass, bronze and aluminum castings for the H. & Z. line of wood

saws, cider mills, etc., and also does custom work. This firm operates the following departments: brass, bronze and aluminum foundry; brass machine shop, tool room, grinding room, casting shop.

The **Meriden Foster Merriam Company, Inc.**, Meriden, Conn., has taken over the assets of **Foster Merriam & Company,** founded in 1835, and announces a reorganization of the old company, management and manufacturing organization of which has been retained in control of both foundry and hardware department. The company is now in a position to render service in the manufacture of light gray iron castings, brass, bronze and aluminum castings, also casters, furniture trimmings and metal specialties. This firm operates the following departments: bronze, aluminum foundry; tool room, galvanizing, plating, polishing, lacquering.

The **Northern Engineering Works,** with general offices and main plant in Detroit, report the close of a most successful year. They build the standardized line of cranes, hoists, etc. As a result of the satisfactory business of the past year, extensive preparations are being made for a very active current year. The following were elected for 1925, at the recent annual meeting: President and treasurer, Henry W. Standart; vice-presidents, William V. Moore, Edward S. Reid; secretary, L H. Olfs; chief engineer, W. Robertson; sales manager, S. E. Schneider; assistant sales manager, W. W. Peattie; advertising manager, G. P. Blackston; superintendent, R. D. McCutcheon; director of inspection and maintenance, F. A. Eckert; service engineer, E. L. Sheldon; purchasing agent, R. R. Taylor.

The **Gisholt Machine Company,** a Madison, Wis., industry for 37 years, recently sponsored an employees' gathering. "Ye Old Timers" were recognized at a banquet given by the company to all employees of twenty years' or more service. The fifty-four men who were invited came from all departments of the big Gisholt plant and were chosen for length of service only. There were eight 30 to 33-year men; nineteen 25 to 29-year men, and twenty-seven 20 to 24-year men on the Old Timers' "Roll Call." Their service in the Gisholt Company totals 1,319 years. The Gisholt Machine Company is known in the manufacture of turret lathes, boring mills and other machine tools. Among other unusual Gisholt products is the Gisholt transformer, known as the only transformer which steps down direct current.

INCORPORATIONS

Cunningham Furnace & Machinery Company, Ltd., 1 York street, London, Ont., Canada, has been incorporated.

Bri-Veil Brass Manufacturing Company, of Orrville, Ohio, has been organized. This company has taken over a brass foundry of Medina, Ohio, and will operate it. **Paul E. Bricker** will act as local manager of the plant.

Smelting & Refining Company, 11-13 Bates street, Jersey City, N. J., has been organized with $50,000 capital stock to operate a refining plant. It occupies a two-story building with modern improvements, and plans in the near future to install and operate a refining and smelting equipment. The company is in the market for all kinds of metals. No contracts have been let.

Superior Grinding Wheel Company, Waltham, Mass., abrasive materials, has been incorporated for $50,000. The officers of the new company are as follows: president and general manager, **W. R. Guild;** treasurer and production manager, **I. S. Decker;** vice-president and sales manager, **H. A. Eaton.** They have purchased the old plant of the **International Abrasive Corporation.**

The **Superior Metals Company** has been formed by a group of Salt Lake men to develop a depost of a shale-like clay which has been discovered in Emery County, Utah. Preliminary tests of metals and alloys treated with this natural flux are highly satisfactory, according to reports. Exhaustive tests of machine parts treated with this product, which is called Superior Flux, are under way in milling, mining, transportation and industrial plants, and if these prove successful the marketing and further development of this natural flux product will proceed immediately. The company owns 640 acres of ground in which the flux deposit occurs. Eighty-eight thousand tons of this flux, it is estimated, have been developed ready for mining out and transporting. Officers and directors of the Superior Metals Company are: **H. C. Loveless,** president; **E. J. Franklin,** vice-president and general manager; **H. W. Horne,** assistant manager; **K. W. Yates,** secretary and treasurer; **A. M. Faddis, Leo Kinney** and **E. A. Carlson** complete the board of directors.

BUSINESS TROUBLES

The White Manufacturing Company of Bridgeport, Conn., will be dissolved and all the assets sold. This firm manufactured carriage, hearse and auto lamps and mountings. Raw material, goods in process, finished material, machinery, fixtures, motors, patents, land and buildings are for sale.

ALUMINUM COMPANY LITIGATION

In a communication sent on February 6, 1925, to the Federal Trade Commissioner, Attorney General Stone, asserted that the Aluminum Company of America has violated provisions of the dissolution decree handed down by the Federal courts, and has practiced price control.

The Attorney General informed the commission that, as its reports threw very little light on the methods of the Aluminum Company since 1922, he had decided a further investigation by Government agents would be necessary, that the Department of Justice might act with full knowledge of the course of the company up to the present time.

NATIONAL LEAD FINANCES

The annual report of the National Lead Company to Dec. 31 shows net earnings of $4,454,979 after all expenses and deductions for taxes, reserves and other accounts. This compares with $5,296,413 in 1923. The earnings for 1924, it was stated, do not include the profit from the insurance reserves, which last year amount to $1.60 on the common stock, making total earnings equal to $14.90 a share.

Commenting upon conditions in the industry, Edward J. Cornish, president, in his statement to stockholders said in part:

"Conditions a year ago were similar to the present. Prices now are a little higher, optimism a little more prevalent. Last summer the sales of babbitt, solder, sheet lead and battery oxides fell off from 30 per cent to 70 per cent, as compared with the previous year. With the increased price of farm products, adding greatly to the current wealth of the nation and equalizing the compensation paid to laborers on the farm with those in the factory and commercial pursuits, there came a pronounced improvement in our own sales."

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America...	$100	$490	$520
American Hardware Corporation...	100	90	92
Anaconda Copper	50	43⅞	44
Bristol Brass	25	11	13
International Nickel, com..........	25	26	26¼
International Nickel, pfd..........	100	96⅝	97¼
International Silver, com..........	100	140	—
International Silver, pfd...........	100	107	110
National Enameling & Stamping...	100	34¾	35¼
National Lead Company, com......	100	156¼	158
National Lead Company, pfd......	100	116½	117
New Jersey Zinc..................	100	188	192
Rome Brass & Copper.............	100	145	..
Scovill Manufacturing Company...	..	242	248
Yale & Towne Mfg. Company, new	..	68½	69½

Corrected by J. K. Rice, Jr., Co., 36 Wall street, New York.

Review of the Wrought Metal Business

Written for The Metal Industry by J. J. WHITEHEAD, President of the Whitehead Metal Products Company of New York, Inc.

At the end of February a reduction of one-half cent per pound was made in the price of fabricated brass and copper materials such as rods, tubes, sheets and wire. This reduction was made in harmony with the lower prices quoted for the raw material. Many consumers who were watching the downward trend of prices of ingot metals held off placing their orders, knowing that if this trend became sufficiently pronounced there would be a reduction in the price of the fabricated products, and as a consequence there was a decided falling-off in the placing of new orders for forward delivery. The complaint in this respect has been general among practically all of the mills, and it appears that with a more or less well-confirmed idea that there would be lower prices in the near future, many consumers adopted the hand-to-mouth buying policy which has characterized their activities during practically the entire year of 1924.

There does not appear to have been any change in the trend of general business which can be held responsible for the lessening of activity in metals, but rather the whole matter seems to come back to the point which has been so often made by the conservative elements of the industry, namely, that the productive capacity of the country is so large that a huge amount of business extended over a long period is necessary before it is possible to utilize it all. It is felt that as the metal business continues to expand, there will be sufficient demand so that the manufacturing facilities may be kept fairly well occupied in normal times, but up to this writing there has not been sufficient expansion to keep all of the productive capacity fully engaged over any long period. The important factors in the industry are very hopeful that there will be enough business to go around during the next two or three years, but as the matter stands today it must be expected that there will be bulges and recessions until the general demand rises.

A very definite contract with the situation indicated above is found in the branch of the industry covering nickel, nickel alloys, Monel metal and nickel silver. In Monel Metal and pure nickel the capacity for manufacturing rods and sheets has been geared to meet normal requirements under good business conditions, and this capacity is now being run on a full 100 per cent basis, and deliveries are beginning to slow up. Many large consumers whose accounts were dormant during 1924 because of the slump in general business, have again become active and have placed large orders. In addition to this, the number of new applications for the metal which were developed during the past couple of years have widened the field for the metal considerably, and sufficient tonnage is now being sold to keep the mills at full speed.

In this connection it is of interest that the casting of pure nickel has been developed to the point where it is possible to furnish the metal in this form at a very reasonable price. This is of considerable importance to the trades which have applications for pure nickel castings, and it is expected that the use of these castings will be greatly increased.

Metal Market Review

Written for The Metal Industry by METAL MAN

COPPER

March 2, 1925

Buying of copper during February was on a comparatively moderate scale. Prices worked lower early in the second half of the month, and under selling pressure by speculative holders a distinctly soft market developed which carried quotations down to 14⅜@14½ cents for nearby domestic deliveries. The selling pressure was divided between traders both here and abroad, but leading producers were not inclined to go after new business on the downward scale of values.

The pressure which put the market down came to an abrupt half. There was a sharp rally from the low point and the market recovered considerable lost ground in response to increased buying. Prices moved up to 14⅝ cents, and later to 14¾ cents for shipment over the next 30 to 60 days. These figures prevailed at the end of February. The market was quiet and easy. Consumption, however, is large, but the tendency of producers to increase output is a fundamental obstacle to a stable and strong copper market.

On March 2, copper dropped to 14¼ cents-14⅜ cents.

ZINC

Recent market movements in zinc have been quiet and reflected a rather uncertain attitude among buyers. March shipments quote $7.50 for Prime Western on E. St. Louis basis and later shipments are available at a shade less. There was a sharp decline in the foreign price early in February owing to liquidation of speculative contracts. The domestic market followed the foreign setback for a time, but there was some recovery from the lowpoint of the month. The statistical position was considered favorable from the producers viewpoint at the beginning of the year, with only 21,208 tons in primary hands. This showing compared with stocks of 50,922 tons on September 1, 1924.

TIN

During a good part of February the market for tin was quiet and narrow. Trading interest both here and abroad was not pronounced enough to attract general buying sufficient to develop speculative enthusiasm on the bull side of the market. The London movements were rather perplexing to local operators.

American deliveries of foreign tin in January amounted to 7,155 tons, the largest since April, 1924, and 3,070 tons greater than those in December. Statistics show that the total new supplies which came into sight during January were only 10,470 tons while deliveries amounted to 12,609 tons. There was therefore a decrease in world visible supply of 2,139 tons which brought down total world visible supplies to 22,949 tons on January 31, 1925. There was considerable activity in the local market during the closing days of February, with prompt and March Straits quoting 56.30 cents and April and May 56.50 cents.

At the beginning of March the London market experienced a sharp decline—£8 per ton. Price on March 2, was £253 15s. for Straits (in New York the price was 54¼ cents-55 cents).

LEAD

Supplies of lead have been increasing and prices weakening. Price concessions by both producers and dealers are significant signs of the decided change in market tendencies which has developed during the last few weeks. Present prices of pig lead of 9.05@9.15 cents compared with the peak quotation of 10.50 cents in January. Speculative movements abroad and market weakness all round have prompted buyers to be specially conservative in their operations. Consumption is maintained at a fair rate, and if new demand should broaden out to an appreciable extent it might tend to stimulate market values once more. There were recent sales at 9 cents New York delivery and at 8.80 cents East St. Louis.

ALUMINUM

Steadiness of market conditions in aluminum is the remarkable feature in connection with this metal. Demand at home and abroad appears well able to absorb supplies at a rate

sufficient to maintain the market on a sound and firm foundation. Virgin aluminum of 99% plus is firm at 28 cents, delivered and 98-99% at 27 cents. Secondary and remelt material is also firmly held. Producers have a ready outlet for shipments.

ANTIMONY

Higher prices were quoted for antimony lately, and values at one time were around 21½ cents for Chinese regulars, duty paid. Several shipments are due during the next few weeks and price has receded to 18 cents duty paid for spot material. Stocks here are small and owing to unsettled conditions in China regular output has been interfered with so long that the market is abnormal and unsatisfactory for the consuming industry. The stringency of the situation may continue for same time, but meanwhile buyers are naturally cautious to contract for supplies on the basis of current quotations.

QUICKSILVER

Prices have come down from the high level of a few weeks ago. Imports of 2,363 flasks in January were larger than usual. Price is down to $78 per flask, but if offerings should increase it might be necessary to make concessions in order to attract buyers.

PLATINUM

Refined platinum quotes $118 per ounce. Demand is enough to keep the market firm. A recent discovery of platinum in South Africa is expected to add important supplies of this metal at lower prices.

SILVER

Price trend in silver has been fairly steady lately, but the range in February did not hold up to 69 cents level long. London and India were buyers when prices softened, but there was no special stimulant to send values higher. The speculative interest has not been particularly pronounced with the result that prices vary but slightly from day to day. Germany has been taking fair amounts from Mexico. If that country increases its silver coinage it will have its influence on the market. Silver stocks at Shanghai showed a decrease lately, but trade conditions in China have been greatly disturbed because of military conditions there. The New York silver bullion market quotes 68⅜ cents per ounce.

OLD METALS

Movements in scrap metals were definitely affected by the markets for the virgin metals. A fair degree of activity is taking place in brass and copper scraps. Lead has turned easier and is not so active as it was. There is considerable hesitation noted among both sellers and buyers owing to the dull features prevailing lately for new copper and lead. Dealers were buying in moderate quantities. They were willing to pay on the basis of 11½@11¾ cents for heavy copper and wire, 12¼@12½ cents for crucible copper, 7@7½ cents for heavy brass, 6@6¼ cents for light brass, 7¼@7½ cents for heavy lead, 5@5¼ cents for battery lead, 4@4¼ cents for old zinc, and 21½@22 cents for aluminum clippings.

WATERBURY AVERAGE

Lake Copper—Average for 1924, 13,419—January, 1925, 15.125—February, 15.00.

Brass Mill Zinc—Average for 1924, 7.10—January, 1925, 8.60—February, 8.00.

Daily Metal Prices for the Month of February, 1925

Records of Daily, Highest, Lowest and Average

	2	3	4	5	6	9	10	11	*12	13	16	17
Copper (f. o. b. Ref.) c/lb. Duty Free												
Lake (Delivered)	15.00	14.875	15.00	15.125	15.125	15.125	15.125	15.00	.....	15.00	15.00	14.875
Electrolytic	14.50	14.35	14.50	14.75	14.80	14.80	14.75	14.70	.....	14.70	14.65	14.55
Casting	14.125	14.00	14.125	14.35	14.375	14.375	14.375	14.25	.....	14.25	14.25	14.125
Zinc (f. o. b. St. L.) c/lb. Duty 1¾c/lb.												
Prime Western	7.40	7.35	7.375	7.50	7.60	7.625	7.55	7.45	.....	7.525	7.60	7.55
Brass Special	7.45	7.40	7.425	7.60	7.65	7.675	7.60	7.55	.....	7.60	7.65	7.60
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	56.75	56.75	57.125	57.625	57.125	56.875	57.25	57.375	.....	57.75	57.50	57.125
Pig 99%	56.25	56.25	56.625	57.125	56.625	56.375	56.75	56.875	.....	57.25	57.00	56.625
Lead (f. o. b. St. L.) c/lb. Duty 2⅜c/lb	9.45	9.45	9.40	9.45	9.45	9.40	9.35	9.35	.....	9.25	9.175	9.175
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	.....	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.												
Ingot	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	.....	31.00	31.00	31.00
Shot	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	.....	32.00	32.00	32.00
Electrolytic	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	.....	38.00	38.00	38.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	18.50	19.00	19.00	19.00	19.25	20.00	21.50	22.00	.....	22.00	21.50	21.50
Silver c/oz. Troy Duty Free	68.875	68.75	68.625	68.75	68.50	68.50	68.375	68.50	.....	68.375	68.375	68.625
Platinum $/oz. Troy Duty Free	117	117	117	117	117	117	117	118	.....	118	118	118

	18	19	20	*23	24	25	26	27	High	Low	Aver.
Copper (f. o. b. Ref.) c/lb. Duty Free											
Lake (Delivered)	14.875	14.875	15.00	.....	15.00	15.00	14.875	14.75	15.125	14.75	14.980
Electrolytic	14.45	14.50	14.55	.....	14.55	14.55	14.50	14.45	14.80	14.35	14.589
Casting	14.125	14.125	14.20	.....	14.25	14.25	14.20	14.125	14.375	14.00	14.215
Zinc (f. o. b. St. L.) c/lb. Duty 1¾c/lb.											
Prime Western	7.50	7.55	7.60	.....	7.575	7.55	7.50	7.45	7.625	7.35	7.514
Brass Special	7.55	7.60	7.65	.....	7.65	7.625	7.575	7.50	7.675	7.40	7.575
Tin (f. o. b. N. Y.) c/lb. Duty Free											
Straits	57.00	57.00	57.125	.....	57.00	57.00	56.75	56.30	57.75	56.30	57.079
Pig 99%	56.50	56.50	56.375	.....	56.25	56.25	55.875	55.50	57.25	55.50	56.50
Lead (f. o. b. St. L.) c/lb. Duty 2⅜c/lb	9.05	9.00	9.00	.....	9.00	9.00	8.90	8.85	9.45	8.85	9.206
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	.....	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.											
Ingot	31.00	31.00	31.00	.....	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Shot	32.00	32.00	32.00	.....	32.00	32.00	32.00	32.00	32.00	32.00	32.00
Electrolytic	38.00	38.00	38.00	.....	38.00	38.00	38.00	38.00	38.00	38.00	38.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	21.00	21.00	20.00	.....	19.50	19.00	18.50	18.00	22.00	18.00	20.014
Silver c/oz. Troy Duty Free	68.375	68.375	68.375	.....	68.50	68.375	68.25	68.375	68.875	68.25	68.493
Platinum $/oz. Troy Duty Free	118	118	118	.....	118	118	118	118	118	117	117.611

*Holiday.

Metal Prices for March 9, 1925

Copper: Lake, 14.75. Electrolytic, 14.50. Casting, 14.125.
Zinc: Prime Western, 7.50. Brass Special, 7.55.
Tin: Straits, 53.50. Pig, 99%, 52.75.
Lead: 8.75. **Aluminum,** 28.00. **Antimony,** 16.50.

Nickel: Ingot, 31.00. Shot, 32.00. Electrolytic, International Nickel Company, 38.00.
Quicksilver, flask, 75 lbs., $79.50. **Silver,** oz. Troy, 68.25.
Platinum, oz. Troy, $118. **Gold,** oz. Troy, $20.67.

Metal Prices, March 9, 1925

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	11½to12½
Brass Ingots, Red	12 to13½
Bronze Ingots	12 to13
Bismuth	$1.95
Cadmium	50 to60
Casting Aluminum Alloys	21 to24
Cobalt—97% pure	$2.50to$2.75
Manganese Bronze Castings	23 to40
Manganese Bronze Ingots	13 to16½
Manganese Bronze Forging	34 to44
Manganese Copper, 30%	28 to45
Parsons Manganese Bronze Ingots	18¼to19¾
Phosphor Bronze	24 to30
Phosphor Copper guaranteed 15%	19 to21
Phosphor Copper, guaranteed 10%	18 to20
Phosphor Tin, guaranteed 5%	65 to70
Phosphor Tin, no guarantee	60 to70
Silicon Copper, 10% ......according to quantity	28 to35

OLD METALS

Buying Prices		Selling Prices
12¼to12½	Heavy Cut Copper	13¼to13¾
12 to12¼	Copper Wire	13 to13½
10¼to10½	Light Copper	11½to12
9¼to 9½	Heavy Machine Comp	10¾to11¼
7¾to 8	Heavy Brass	8¾to 9¼
6¾to 7	Light Brass	8 to 8¼
8¼to 8¾	No. 1 Yellow Brass Turnings	9¾to10
8½to 9	No. 1 Comp. Turnings	10 to10½
8 to 8¼	Heavy Lead	8¾to 9
4¾to 5	Zinc Scrap	5¾to 6
10	Scrap Aluminum Turnings	12 to14
16 to17	Scrap Aluminum, cast alloyed	18 to19
20	Scrap Aluminum, sheet (new)	23 to25
32	No. 1 Pewter	36 to38
12	Old Nickel anodes	14
18	Old Nickel	20

BRASS MATERIAL—MILL SHIPMENTS

In effect Feb. 27, 1925

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.19⅛	$0.20⅞	$0.22.⅞
Wire	.19⅝	.21⅜	.23⅜
Rod	.17⅛	.21⅝	.23⅝
Brazed tubing	.27⅛	......	.32⅝
Open seam tubing	.27⅛	......	.32⅝
Angles and channels	.30⅛	......	.35⅝

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.20⅛	$0.21⅞	$0.23⅞
Wire	.20⅝	.22⅜	.24⅜
Rod	.18⅛	.22⅝	.24⅜
Brazed tubing	.28⅛	......	.33⅝
Open seam tubing	.28⅛	......	.33⅝
Angles and channels	.31⅛	......	.36⅝

SEAMLESS TUBING

Brass, 23¾c. to 24¾c.
Copper, 24¾c. to 25¾c.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	21⅛c. net base
Muntz or Yellow Metal Sheathing (14"x48")	19⅛c. net base
Muntz or Yellow Rectangular sheet other Sheathing	20⅛c. net base
Muntz or Yellow Metal Rod	17⅛c. net base

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	21½c. to 24 c. net base
From stock	22½c. to 24½c. net base

BARE COPPER WIRE—CARLOAD LOTS

16⅞c. to 17c. net base.

SOLDERING COPPERS

300 lbs and over in one order	21½c. net base
100 lbs to 200 lbs. in one order	22 c. net base

ZINC SHEET

Duty, sheet, 15%.	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount	10.50 basis
Casks, jobbers' price	11.75 net base
Open Casks, jobbers' price	12.25 to 12.50 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price	40c.
Aluminum coils, 24 ga., base price	36.70c.
Foreign	40c.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Nickel Silver Sheet Metal

10%	Quality	26¾c.
15%	"	28 c.
18%	"	29¼c.

Nickel Silver Wire and Rod

10%	"	30 c.
15%	"	33½c.
18%	"	36½c.

MONEL METAL

Shot	32
Blocks	32
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	48
Hot Rolled Sheets (base)	42

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 35 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs. 25c. over. Above prices f. o. b. mill.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 71½c. to 73½c. per Troy ounce, depending upon quantity.

Rolled sterling silver 68¾c. to 70¾c.

NICKEL ANODES

90 to 92% purity	43 c.-45 c. per lb.
95 to 97% purity	45 c.-47 c. per lb.

Supply Prices, March 9, 1925

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.10-.14
Acid—		
Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	02
Hydrochloric, C. P., 20 deg., Carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., Carboys	lb.	.06
Nitric, 42 deg., Carboys	lb.	.07
Sulphuric, 66 deg., Carboys	lb.	.02
Alcohol—		
Butyl	lb.	.27-.32
Denatured in bbls	gal.	.60-.62
Alum—		
Lump Barrels	lb.	.04
Powdered, Barrels	lb.	.04½
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—		
Sulphate, tech., bbls	lb.	.03¾
Sulphocyanide	lb.	.65
Argols, white, see Cream of Tartar	lb.	.27
Arsenic, white, kegs	lb.	.16
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), bbls	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls	lb.	.34
Cobalt Chloride	lb.	—
Copper—		
Acetate	lb.	.37
Carbonate, bbls	lb.	.17
Cyanide	lb.	.50
Sulphate, bbls	lb.	.05¼
Copperas (Iron Sulphate, bbl.)	lb.	.01½
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.50
Gold Chloride	oz.	$14.00
Gum—		
Sandarac	lb.	.26
Shellac	lb.	.59-.61
Iron, Sulphate, see Copperas, bbl	lb.	.02
Lead Acetate (Sugar of Lead)	lb.	.13
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.15
Nickel—		
Carbonate Dry	lb.	.40
Chloride, 100 lb. lots	lb.	.22½
Salts, single bbls	lb.	.10½
Salts, double bbl.	lb.	.10
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity		.35-.40
Potash, Caustic Electrolytic 88-92% fused, drums	lb.	.08¾
Potassium Bichromate, casks	lb.	.08¾
Carbonate, 80-85%, casks	lb.	.05¾
Cyanide, 165 lb. cases, 94-96%	lb.	.60
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls	lb.	.03
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide (Fluctuating Price)	oz.	.70
Nitrate, 100 ounces lots	oz.	.48
Soda Ash, 58%, bbls	lb.	.02½
Sodium—		
Biborate, see Borax (Powdered), bbls	lb.	.05½
Cyanide, 96 to 98%, 100 lbs	lb.	.70
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls	lb.	.04¾
Phosphate, tech., bbls	lb.	.03½
Silicate (Water Glass), bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.13
Sulphur (Brimstone), bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.40
Tripoli, Powdered	lb.	.03
Verdigris, see Copper Acetate	lb.	.37
Water Glass, see Sodium Silicate, bbls	lb.	.02
Wax—		
Bees, white ref. bleached	lb.	.55
Yellow, No. 1	lb.	.35
Whiting, Bolted	lb.	.02½-.06
Zinc, Carbonate, bbls	lb.	.11
Chloride, 600 lb. lots	lb.	—
Cyanide	lb.	.41
Sulphate, bbls	lb.	.03⅛

COTTON BUFFS

Open buffs, per 100 sections (nominal),

12 inch, 20 ply, 64/68, unbleached sheeting	base,	$32.40-	$40.85
14 inch, 20 ply, 80/96, " "	base,	45.25-	50.80
12 inch, 20 ply, 80/96, " "	base,	47.35-	46.20
14 inch, 20 ply, 84/92, " "	base,	63.15-	62.25
12 inch, 20 ply, 88/96, " "	base,	.....	63.25
14 inch, 20 ply, 88/96, " "	base,	.....	85.15
12 inch, 20 ply, 80/96, " "	base,	.....	52.70
14 inch, 20 ply, 80/96, " "	base,	.....	70.80

Sewed Buffs, per lb., bleached and unbleached. base, .55 to .75

FELT WHEELS

U. S. A. Brand		Price Per Lb. Less Than 100 Lbs.	300 Lbs. and Over
Diameter—10" to 16"	1" to 3"	$3.00	$2.65
" 6" 8" and over 16"	1" to 3"	3.10	2.75
" 6" to 24"	Over 3"	3.40	3.05
" 6" to 24"	½" to 1"	4.00	3.65
" 4" to 6"	¼" to 3"	4.85	Any quantity
" Under 4"	¼" to 3"	5.45	Any quantity

Grey Mexican or French Grey—10c. less per lb. than Spanish, above.

FELT WHEELS

	6" to 18"	Over 18"	Under 6"
Over 3"	$3.00	$3.30	$3.75
1" to 3"	2.60	2.70	3.75
Under 1"	3.30	3.60	3.75